Bharat Heavy Electricals Limited
(A Govt. Of India Undertaking)
Power Sector, Eastern Region
BHEL Bhawan, Plot No. DJ-9/1, Sector- II,
Salt Lake City, Kolkata, WEST BENGAL, INDIA
Phone: 033-23398220, 23211690, FAX: 033-23211960

NOTICE INVITING TENDER (NIT)

OFFERS ARE INVITED FROM REPUTED & EXPERIENCED BIDDERS (MEETING PRE-QUALIFICATION CRITERIA AS MENTIONED) THROUGH NIC E-PROCUREMENT PORTAL https://eprocurebhel.co.in ONLY for THE SUBJECT JOB BY THE UNDERSIGNED ON BEHALF OF BHARAT HEAVY ELECTRICALS LIMITED AS PER THE TENDER DOCUMENT. ISSUE OF TENDER TO ANY BIDDER SHALL NOT CONSTRUE THAT THE BIDDER IS CONSIDERED TO BE QUALIFIED. FOLLOWING POINTS RELEVANT TO THE TENDER MAY PLEASE BE NOTED AND COMPLIED WITH.

Salient Features of NIT

SL NO	ISSUE	DESCRIPTION	
i	E-TENDER NUMBER	**PSER:PUR:BRH-S434:20 (ENQ:20:PP:0015:PUR:88) Date 05/03/2021.**	
ii	Broad Scope of job	**"ERECTION, TESTING & COMMISSIONING OF LTRH PENDENT COILS BANK, LTRH HORIZONTAL COILS BANK, ECONOMISER HORIZONTAL COILS BANK, LIFTING OF ECONOMISER OUTLET HEADER, REPLACEMENT OF 8 NOS. SEPARATOR SAFETY VALVE, SHORTENING OF LENGTH OF FSH REAR COIL ASSY., REMOVAL OF 3 PLATEN ASSEMBLIES (9TH, 17TH & 25TH FROM BOILER LEFT SIDE TO BE REMOVED) FROM PSH ASSY. & 144 HEADER END PLUGS/BLANKED ARE TO BE INSTALLED, WELDED AT THE END OF HEADER NIPPLES OF PSH ALONG WITH CUP LOCK SCAFFOLDING ARRANGEMENT AND ERECTION & DISMANTLING UPTO BOTTOM OF PSH, ALONG WITH CONNECTED ACCESSORIES AND HYDRAULIC TEST OF THESE NEW COILS ALONG WITH OTHER RELATED CIRCUITS OF BOILER, AH SOOT BLOWER PIPING & SUPPORTS, EXTENDED BACK PASS BOTTOM SUPPORTS, ECONOMISER ANTI VIBRATION BAFFLES & CASTABLE REFRACTORY FOR EXTENDED BACK PASS PANEL AT 2X660 MW NTPC BARH STAGE-II, U#5, BARH, PATNA, BIHAR".**	
iii	ISSUE OF TENDER DOCUMENTS	a) *Online through e-procurement platform at (https://eprocurebhel.co.in)* b) In BHEL website (www.bhel.com & CPP Portal) : For tender view purpose only Start date of the tender: 05/03/2021	*1. Applicable* *2. Applicable*
iv	DUE DATE & TIME OF OFFER SUBMISSION	*Date: 15/03/2021, Time: 14-00 Hrs. IST* *(Offer to be submitted online only through e-procurement platform at https://eprocurebhel.co.in)*	*Applicable*
v	TECHNO-COMMERCIAL BID OPENING OF TENDER	*Date: 15/03/2021, Time: 16-30 Hrs. IST* *(online only through e-procurement platform at https://eprocurebhel.co.in, participating bidders may witness the same online only)*	*Applicable*
vi	EMD AMOUNT	*Not Applicable*	*Not Applicable*
vii	COST OF TENDER	--	*Not Applicable*

viii	LAST DATE FOR SEEKING CLARIFICATION	*Date: 12/03/2021 (UP TO 11:00 Hrs.)*	*Applicable*
ix	SCHEDULE OF Pre Bid Discussion (PBD)	If any, shall be intimated through Tender Change Notice (TCN)	*Not Applicable*
x	INTEGRITY PACT & DETAILS OF INDEPENDENT EXTERNAL MONITOR (IEM)	IEM DETAILS: NAME: Shri Arun Chandra Verma, IPS (Retd.) EMAIL: acverma1@gmail.com NAME: Shri Virendra Bahadur Singh, IPS (Retd.) EMAIL: vbsinghips@gmail.com	*Applicable*
xi	Latest updates	Latest updates on the important dates, Amendments, Correspondences, Corrigenda, Clarifications, Changes, Errata, Modifications, Revisions, etc. to Tender Specifications will be hosted in BHEL webpage (www.bhel.com →Tender Notifications →View Corrigendum & CPP Portal →Tender Notice & E-PROCUREMENT PORTAL https://eprocurebhel.co.in). Bidders to keep themselves updated with all such information.	*Shall be intimated to bidder*
xii	Evaluation currency	INDIAN RUPEES (INR)	

The offer shall be submitted as per the instructions of tender document. Only One set of tender document (**in original, downloaded from website**) signed by authorised company rep. of bidder and stamped on each page shall be submitted as detailed further, as given below. Bidders to note specifically that all pages of tender document, including these NIT pages etc. appearing in the website for this particular tender shall be submitted by them (after signing/stamping on each page) as a part of their offer. **Price shall not be mentioned by them anywhere in the techno-commercial portion of offer. Price shall be mentioned in the relevant price schedule only and to be submitted in e-procurement portal/platform in the form and manner mentioned in tender.**

For E-PROCUREMENT ASSISTANCE & TRAINING, NIC PORTAL HELPDESK CONTACTS AS PER FOLLOWING: -

For any technical related queries please call at 24 x 7 Help Desk Number
0120-4001 002

0120-4200 462

0120-4001 005

0120-6277 787

Email Support
Address: A) For any Issues or Clarifications relating to the published tenders, bidders are requested to contact the respective Tender Inviting Authority

Technical - support-eproc@nic.in

or for any difficulty in downloading the tender from internet website, they should contact this office (Dy. Engineer, Purchase or Dy. Manager, Purchase or SDGM, Purchase Phone no. 033-23398261/8223/8220). No alteration/changes by bidders is permitted in the tender/NIT appeared in the website.

1.0 Successful bidder shall have to submit additional set of tender/sign on tender document provided by BHEL, if so decided by BHEL.

2.0 **Earnest Money Deposit (EMD)** - **NOT APPLICABLE**

3.0 This is an E-tender floated online through our E-Procurement Site https://eprocurebhel.co.in. The bidder should respond by submitting their offer online only in our e-Procurement platform at https://eprocurebhel.co.in. Offers are invited in two-parts only. No Hard copy bid or bids through email/ fax shall be accepted. Bids are invited in two parts & shall be submitted as described below:

OFFER DESCRIPTION	DOCUMENTS TO BE UPLOADED & MODALITY OF UPLOADING
TECHNICAL OFFER	1.Scanned copy of Covering letter of offer (To be attached in **relevant Attachment** section) 2. Scanned copy of Entire tender documents signed & stamped in each page by authorized representative of the bidder except price bid (To be attached in **relevant Attachment** section). 3. Scanned copy of Techno-Commercial Offer (To be attached in **relevant Attachment** section) 4. Duly filled all annexures except price & unpriced format (To be attached in **relevant Attachment** section). 5. Copy of records notes of Pre-Bid Conference, if applicable/ pre-bid MOM. (To be attached in **relevant Attachment** section) 6. Copy of Tender change notice (TCN), if applicable (To be attached in **relevant Attachment** section) 7. All supporting documents/ Annexures etc. as applicable (To be attached in **relevant Attachment** section). 8. No deviation certificate in bidder's letterhead as per format given in Tender (To be attached in **relevant Attachment** section).
PRE-QUALIFICATION PART	9. Pre-qualifying documents with all credentials as per tender. (To be attached in **relevant Attachment** section)
UNPRICED PRICE BID	10. Price schedule – Unpriced but mentioning only quoted / unquoted against each item as per tender. (To be attached in **Unpriced bid Attachment** section)
PRICE BID	11. Duly filled in Price Schedule as per tender. (To be attached in **price bid Attachment** section) Any other document uploaded in the price bid, apart from tendered Price schedule, shall not be taken into cognizance for evaluation of offer.

SPECIAL NOTE:

A) Offer & documents submitted with the offer shall be signed and stamped in each page by authorised representative of the bidder. No overwriting/correction in tender documents by bidders shall be allowed. However, if correction is unavoidable, the same may be signed by authorized signatory.

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

C) 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.	Shri Arun Chandra Verma, IPS (Retd.)	acverma1@gmail.com
2.	Shri Virendra Bahadur Singh, IPS (Retd.)	vbsinghips@gmail.com

(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 any of the above IEM(s). 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):

Name	Ms. Anima Mandal / Mr. U. Howlader	Mr. Avijit Pan
Dept.	Purchase Dept., BHEL PSER, Kolkata	Purchase Dept., BHEL PSER, Kolkata
Address	DJ-9/1, Sector – II, Salt Lake, Kolkata –700091	DJ-9/1, Sector – II, Salt Lake, Kolkata – 700091
Phone	033-2339 8261 / 8223	033-2339 8220
Email	anima@bhel.in / ujjwalh@bhel.in	avijitpan@bhel.in
FAX	033-2321 1960	033-2321 1960

4.0 No deviation with respect to tender clauses and no additional clauses/ suggestions/clarification in Techno-commercial bid/Price bid shall normally be considered by BHEL. Bidders are requested to positively comply with the same. Offers with deviation are liable for rejection.

5.0 BHEL reserves the right to accept or reject any or all offer without assigning any reasons thereof. BHEL also reserve the right to cancel the tender wholly or partly without assigning any reason thereof. BHEL also reserve the right to split/part award the job. Also, BHEL shall not entertain any correspondence from bidders in this matter (except for the refund of EMD).

6.0 Since the job shall be executed at site, the bidders must visit site/ work area and study the job content, facilities available, availability of materials, prevailing site conditions including Law and Order situation, applicable Wage structure, Wage rules, present condition of machines etc. before quoting for this tender. They may also consult this office before submitting their offers, for any clarifications regarding scope of work, facilities available at sites or on terms and conditions. No additional claim shall be entertained by BHEL in future, on account of non-acquaintance of site/machine conditions at the time of bidding.

7.0 For any clarification on the tender document, you may seek the same in writing or through e-procurement portal/platform as per specified format within the last date of seeking clarification as per tender. BHEL shall not be responsible for receipt of queries after due date of seeking clarification due to postal delay, and receipt of any query after due date shall not be entertained.

8.0 BHEL may decide holding Pre-bid Discussion [PBD] with all intending bidders. On such communication from BHEL, the bidder shall ensure participation for the same at the appointed time, date and place as may be decided by BHEL. Outcome of PBD (if any) shall also form part of tender.

9.0 In case of absence of any queries from bidder(s), their quoted price will be PRESUMED to be final and complete with reference to the tender documents (including Tender change notes (TCNs), clarifications, corrigendum issued by BHEL, if any). Bidders are requested to study the tender documents in detail and prepare their queries/clarifications accordingly. All such queries / clarifications shall be cleared/replied by BHEL. Such clarification letters, corrigendum and/or Tender change notes (TCNs), if issued by BHEL, shall form part of tender document.

10.0 In the event of any conflict between requirement of any clause of this specification/ documents /drawings /data sheets etc. or requirements of different codes/ standards specified/ contradictions between any two clauses of tender document, the same to be brought to the knowledge of BHEL by bidders in writing for clarification before due date of seeking clarification, otherwise, more stringent requirement as may be interpreted by BHEL shall prevail and shall be binding on you. Any typing error/missing pages/ other clerical errors in the tender documents, noticed by you must be pointed out before submission of offer, or else, BHEL's interpretation shall prevail & binding on you.

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

12.0 Tender document containing above mentioned volumes shall be signed & stamped in all pages including this covering letter. Price bid shall be furnished in the specified format enclosed with the tender. Any additional copy, if required, may be taken by photocopying from the tender document given in the web.

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

14.0 The Bidder has to satisfy the Pre-Qualifying Requirements stipulated for this Tender in order to be qualified. The Price Bids of only those bidders will be opened, who will qualify for the subject job on the basis of pre-qualification evaluation & Techno-Commercial bids etc. BHEL reserves the right to reject the bidders with unsatisfactory past performance in the execution of a contract. BHEL's decision in this regard shall be final & binding.

15.0 While BHEL reserve the right to open the price bid of the offers in camera, the date & time to open the PRICE BID, tender opening shall be intimated to the bidders in case BHEL decides it to be 'Public opening' and in such a case, one authorised representative of the bidder shall be allowed to attend.

16.0 Validity of the offer shall be for Six months from the due date of offer submission (including extension, if any) unless specified otherwise.

17.0 Firm prices are to be quoted in whole rupees, in the place meant for price or on the price schedule enclosed as applicable for the full scope of work given in tender. The rates quoted must be in figures and words as well (Prices quoted must be workable too for the job involved). Prices quoted by the bidders should be inclusive of all taxes and duties leviable by any Statutory Authority for this job as on the date of the tender opening (excluding GST & BOCW Cess).

18.0 Price Bids shall be evaluated in the manner as prescribed in Price Schedule. However, Unit Rates shall also be furnished if applicable in the Price Schedule.

19.0 Bid should be free from correction, overwriting, using corrective fluid, etc. Any interlineation, cutting, erasure or overwriting shall be valid only if they are attested under full signature(s) of person(s) signing the bid else bid shall be liable for rejection.

20.0 Bidders are required to submit their BEST price as per tender Price Schedule format in e-procurement portal/platform in the form & manner as mentioned in tender.

21.0 Reverse Auction (RA) not applicable for this tender.

22.0 Bidders are requested to note that the accepted / agreed tender terms (technical, commercial or on Reverse Auction) in their original offer can not be altered / withdrawn by their own during the processing of tender.

23.0 The 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.

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

I) Integrity commitment, performance of the contract and punitive action thereof:

a) Commitment by BHEL:

BHEL commits to take all measures necessary to prevent corruption in connection with the tender process and execution of the contract. BHEL will during the tender process treat all Bidder(s) in a transparent and fair manner, and with equity.

b) Commitment by Bidder/ Supplier/ Contractor:

b. i) The bidder/ supplier/ contractor commit to take all measures to prevent corruption and will not directly or indirectly influence any decision or benefit which he is not legally entitled to nor will act or omit 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.

b. ii) The bidder/ supplier/ contractor 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 and shall adhere to relevant guidelines issued from time to time by Govt. of India/ BHEL.

b. iii) The bidder/ supplier/ contractor will perform/ execute the contract as per the contract terms & conditions and will not default without any reasonable cause, which causes loss of business/ money/ reputation, to BHEL.

If any bidder/ supplier/ contractor during pre-tendering/ tendering/ post tendering/ award/ execution/ post-execution stage includes in 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 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, then, 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.

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

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

27.0 Suspension of Business dealings with Suppliers/ Contractors: BHEL reserves the right to take action against contractors who fail to perform or indulge in malpractices, by suspending business dealings with them as detailed in Annexure-A.

28.0 "For this procurement, the local content to categorize a supplier as a Class-I local supplier/ Class-II local supplier/ Non-Local supplier and purchase preference 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 NIT, the same shall be applicable even if issued after issue of this NIT, but before opening of Part-II bids against this NIT".

Duly filled & signed Form-1 (Format for local content), as applicable, to be submitted by bidders along with their techno-commercial offer.

29.0 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) if they submit along with the offer, attested copies of either Udyam Registration Certificate or EM II certificate having deemed validity (five years from the date of issue of acknowledgement in EM II) or valid NSIC certificate or Udyog Aadhar Memorandum (UAM) & Acknowledgement or EM II certificate along with attested copy of a CA certificate (Format enclosed at Annexure – B where deemed validity of EM II certificate of five years has expired) applicable for the relevant financial year (latest audited). Date to be reckoned for determining the deemed validity will be the date of bid opening (Part 1 in case of two part bid). Non submission of such documents will lead to consideration of their bid at par with other bidders. No benefit shall be applicable for this enquiry if any deficiency in the above required documents are not submitted before price bid opening. If the tender is to be submitted through e-procurement portal, then the above required documents are to be uploaded on the portal. Documents should be notarized or attested by a Gazetted officer.

Any Bidder falling under MSME 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 MSME	SC/ST owned	Women owned	Others
Micro			
Small			
Medium			

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

30.0 Bidder shall submit duly filled & signed Form-2 along with their techno-commercial offer towards compliance of Department of Expenditure's (DoE) Public Procurement Division Order vide ref. F.No.6/18/2019-PPD dated 23.07.2020 & 24.7.2020. In this connection, following may be noted:

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.

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 order 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 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.

VI. The successful bidder shall not be allowed to sub-contract works to any contractor from a country which shares a land border with India unless such contractor is registered with the Competent Authority. However, in this regard, provision of Clause no 1.9.8 of GSCC shall also be applicable.

31.0 GeMAR and PTS ID: GEM/GARPTS/26022021/M1PWOKDQT5UU

32.0 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.

Bidder shall submit duly filled & signed Annexure-VII along with their techno-commercial offer.

33.0 In the course of evaluation, if more than one bidder happens to occupy L-1 status, effective L-1 will be decided by soliciting discounts from the respective L-1 bidders.

In case more than one bidder happens to occupy the L-1 status even after soliciting discounts, the L-1 bidder shall be decided by a toss / draw of lots, in the presence of the respective L-1 bidder(s) or their representative(s).

Ranking will be done accordingly. BHEL’s decision in such situations shall be final and binding.

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

i) Amendments/Clarifications/Corrigenda/Errata/Tender change notice (TCN) etc. issued in respect of the tender documents by BHEL
ii) Notice Inviting Tender (NIT)
iii) Price Schedule
iv) Scope of work & other details - Annexure-I, Annexure-BOCW, Field Welding Schedule, Drawings, Annexure-II, Annexure-III, Annexure for HSE & OCP.
v) SPECIFIC TERMS AND CONDITIONS FOR SERVICES JOBS
vi) GENERAL & SPECIAL CONDITIONS OF CONTRACT FOR SERVICES JOB

All the bidders are requested to note that all the errata / technical clarifications / corrigendum / extension etc. shall be published THROUGH E-PROCUREMENT PORTAL https://eprocurebhel.co.in and in website www.bhel.com & http://eprocure.gov.in . As such, all the bidders are requested to be in continuous touch with these websites.

for BHARAT HEAVY ELECTRICALS LTD.

DY. MANAGER (PURCHASE)

Agency	Contact details	
BHEL, PSER, Kolkata	Address	BHARAT HEAVY ELECTRICALS LIMITED, POWER SECTOR – EASTERN REGION 2ND FLOOR, BLOCK-DJ, PLOT- 9/1, SECTOR, SALT LAKE CITY, KOLKATA – 700 091
	Phone no.	033-23398261, 23388223, 23398220, 23211690
	FAX no.	033-23211960
	E-mail ID	anima@bhel.in, ujjwalh@bhel.in, avijitpan@bhel.in
NIC E-PROCUREMENT PORTAL	For E-PROCUREMENT ASSISTANCE & TRAINING, NIC HELPDESK CONTACTS AS PER FOLLOWING: - For any technical related queries please call at 24 x 7 Help Desk Number 0120-4001 002 0120-4200 462 0120-4001 005 0120-6277 787 Email Support Address: A) For any Issues or Clarifications relating to the published tenders, bidders are requested to contact the respective Tender Inviting Authority Technical - support-eproc@nic.in	

ANNEXURE - IV

FORMAT FOR NO DEVIATION CERTIFICATE
(To be submitted in the bidder's letter head)

To,
Bharat Heavy Electricals Limited,
POWER SECTOR – EASTERN REGION
2nd FLOOR, Block-DJ, Plot- 9/1, SECTOR II
SALT LAKE CITY, KOLKATA – 700 091
FAX – 033-2321-1960

Job: "ERECTION, TESTING & COMMISSIONING OF LTRH PENDENT COILS BANK, LTRH HORIZONTAL COILS BANK, ECONOMISER HORIZONTAL COILS BANK, LIFTING OF ECONOMISER OUTLET HEADER, REPLACEMENT OF 8 NOS. SEPARATOR SAFETY VALVE, SHORTENING OF LENGTH OF FSH REAR COIL ASSY., REMOVAL OF 3 PLATEN ASSEMBLIES (9TH, 17TH & 25TH FROM BOILER LEFT SIDE TO BE REMOVED) FROM PSH ASSY. & 144 HEADER END PLUGS/BLANKED ARE TO BE INSTALLED, WELDED AT THE END OF HEADER NIPPLES OF PSH ALONG WITH CUP LOCK SCAFFOLDING ARRANGEMENT AND ERECTION & DISMANTLING UPTO BOTTOM OF PSH, ALONG WITH CONNECTED ACCESSORIES AND HYDRAULIC TEST OF THESE NEW COILS ALONG WITH OTHER RELATED CIRCUITS OF BOILER, AH SOOT BLOWER PIPING & SUPPORTS, EXTENDED BACK PASS BOTTOM SUPPORTS, ECONOMISER ANTI VIBRATION BAFFLES & CASTABLE REFRACTORY FOR EXTENDED BACK PASS PANEL AT 2X660 MW NTPC BARH STAGE-II, U#5, BARH, PATNA, BIHAR".

E-Tender No.: PSER:PUR:BRH-S434:20 (ENQ:20:PP:0015:PUR:88) Date 05/03/2021.

Dear Sir/Madam,

With reference to above, this is to confirm that as per tender conditions, we have visited site before submission of our offer and noted the job content & site conditions etc. We also confirm that we have not changed/modified the tender documents as appeared in the websites and in case of observance at any stage, it shall be treated as null and void.

We hereby confirm that we have not taken any deviation from tender clauses together with other references as enumerated in the above referred NIT and confirm our acceptance to integrity pact (if applicable) and we hereby convey our unqualified acceptance to all terms and conditions as stipulated in the tender and NIT.

In the event of observance of any deviation in any part of our offer at a later date whether implicit or explicit, the deviations shall stand null & void.

We confirm to have submitted offer strictly in accordance with tender instructions.

Thanking you,

Yours faithfully,

(Signature, date & seal of authorized
representative of the contractor)

ANNEXURE - V

PRE – QUALIFICATION CRITERIA

Job: "ERECTION, TESTING & COMMISSIONING OF LTRH PENDENT COILS BANK, LTRH HORIZONTAL COILS BANK, ECONOMISER HORIZONTAL COILS BANK, LIFTING OF ECONOMISER OUTLET HEADER, REPLACEMENT OF 8 NOS. SEPARATOR SAFETY VALVE, SHORTENING OF LENGTH OF FSH REAR COIL ASSY., REMOVAL OF 3 PLATEN ASSEMBLIES (9TH, 17TH & 25TH FROM BOILER LEFT SIDE TO BE REMOVED) FROM PSH ASSY. & 144 HEADER END PLUGS/BLANKED ARE TO BE INSTALLED, WELDED AT THE END OF HEADER NIPPLES OF PSH ALONG WITH CUP LOCK SCAFFOLDING ARRANGEMENT AND ERECTION & DISMANTLING UPTO BOTTOM OF PSH, ALONG WITH CONNECTED ACCESSORIES AND HYDRAULIC TEST OF THESE NEW COILS ALONG WITH OTHER RELATED CIRCUITS OF BOILER, AH SOOT BLOWER PIPING & SUPPORTS, EXTENDED BACK PASS BOTTOM SUPPORTS, ECONOMISER ANTI VIBRATION BAFFLES & CASTABLE REFRACTORY FOR EXTENDED BACK PASS PANEL AT 2X660 MW NTPC BARH STAGE-II, U#5, BARH, PATNA, BIHAR".

E-Tender No.: PSER:PUR:BRH-S434:20 (ENQ:20:PP:0015:PUR:88) Date 05/03/2021.

SL NO	CRITERIA
A	PRE-QUALIFICATION CRITERIA (FINANCIAL)
1.0 (a)	BIDDER SHOULD HAVE AVERAGE ANNUAL TURNOVER OF MINIMUM Rs 222.40 LAKHS DURING THREE CONSECUTIVE FINANCIAL YEARS 2017-18, 2018-19 AND 2019-20 AND SHOULD HAVE POSITIVE NET WORTH AS ON LATEST AUDITED ACCOUNTS AS SUBMITTED FOR PARA 1(C).
(b)	BIDDER MUST HAVE EARNED PROFIT IN ANY ONE OF THE THREE CONSECUTIVE FINANCIAL YEARS 2017-18, 2018-19 AND 2019-20. AUDITED BALANCE SHEET AND PROFIT & LOSS ACCOUNT OF THE COMPANY FOR THE ABOVE MENTIONED FINANCIAL YEARS, NEED TO BE SUBMITTED IN SUPPORT OF ABOVE.
(c)	IN CASE AUDITED BALANCE SHEET AND PROFIT & LOSS ACCOUNT HAS NOT BEEN SUBMITTED FOR ALL THREE YEARS INDICATED ABOVE THEN APPLICABLE FINANCIAL AUDITED STATEMENTS SUBMITTED BY THE BIDDER AGAINST THE REQUISITE THREE YEARS WILL BE AVERAGED FOR THREE YEARS.
(d)	IF FINANCIAL STATEMENTS ARE NOT REQUIRED TO BE AUDITED STATUTORILY, THEN INSTEAD OF AUDITED FINANCIAL STATEMENTS, FINANCIAL STATEMENTS ARE REQUIRED TO BE CERTIFIED BY CHARTERED ACCOUNTANT.
	PRE-QUALIFICATION CRITERIA (TECHNICAL)
2.0	BIDDER SHOULD HAVE EXECUTED AT LEAST ONE JOB OF "ERECTION & COMMISSIONING OF BOILER PRESSURE PARTS" OR "RETROFITTING IN RESPECT OF COILS OF ECONOMISER / SUPER-HEATER / RE-HEATER" OR "OVERHAULING JOB OF (BOILER PRESSURE PARTS AND 'STRUCTURE/NON PRESSURE PARTS/ESP/ROTARY MACHINES/INSULATION/PIPING/AUXILIARIES/DUCTING/ANY COMBINATION OF THESE PARTS')" OF AN UNIT OF RATING 190 MW OR ABOVE IN ANY UTILITY/ INDUSTRIAL PROJECT IN LAST 7 (SEVEN) YEARS, ENDING ON LATEST DUE DATE OF SUBMISSION OF OFFER. RELEVANT SUPPORTING DOCUMENTS FROM PURCHASER / END USER SHALL BE SUBMITTED.
NOTE FOR SL NO 2.0 ABOVE	
THE WORD "EXECUTED" MEANS: THE WORK SHALL HAVE BEEN COMPLETED UPTO LIGHT UP OF BOILER EVEN IF THE CONTRACT HAS NOT BEEN COMPLETED OR CLOSED.	
3.0	BIDDER SHOULD HAVE "VALID CERTIFICATE OF RECOGNITION AS BOILER REPAIRER / ERECTOR WITH PRESSURE RATING CATEGORY CLASS-I OR ABOVE" FROM THE DIRECTOR OF BOILERS. RELEAVANT SUPPORTING DOCUMENT SHALL BE SUBMITTED.
4.0	BIDDER SHOULD HAVE VALID PAN. RELEVANT SUPPORTING DOCUMENTS SHALL BE SUBMITTED.
5.0	NO CONSORTIUM / JV BIDDING IS ALLOWED FOR THIS TENDER.
6.0	CONSIDERATION OF OFFER WILL BE SUBJECT TO CUSTOMER'S APPROVAL OF BIDDER.
Note	1) AFTER SATISFACTORY FULFILLMENT OF ALL THE ABOVE CRITERIA, OFFER SHALL BE CONSIDERED FOR FURTHER EVALUATION AS PER NIT AND ALL OTHER TERMS OF THE TENDER. 2) ONE MW IS EQUIVALENT TO 3.5 TPH WHERE EVER RATING OF BOILER IS MENTIONED IN TPH, FOR THE PURPOSE OF EVALUATION OF PQR. 3) BIDDER MUST NOT BE UNDER BANKRUPTCY CODE PROCEEDINGS (IBC) BY NCLT OR UNDER LIQUIDATION / BIFR, WHICH WILL RENDER HIM INELIGIBLE FOR PARTICIPATION IN THIS TENDER, AND SHALL SUBMIT UNDERTAKING TO THIS EFFECT.

GENERAL INFORMATION:

VENDOR SHOULD FURNISH INFORMATION REGARDING PROJECTS IN HAND, DETAILS OF CURRENT LITIGATION AND ARBITRATION CASES, ORDERS REGARDING EXCLUSION/EXPULSION OR BLACK LISTING, IF ANY.

CORRIGENDUM/EXTENSION (IF ANY) OF THIS TENDER WILL BE PUBLISHED IN WEBSITES.

INTERESTED BIDDERS MEETING THE ABOVE QUALIFYING REQUIREMENTS MAY DOWNLOAD TENDER DOCUMENTS FROM AFORESAID WEBSITE(S).

i)	DOWNLOAD OF TENDER DOCUMENT STARTS	**05/03/2021**
ii)	TENDER DOWNLOAD CLOSES ON	**15/03/2021 AT 14:00 HRS. IST**
iii)	LAST DATE OF SEEKING CLARIFICATIONS	**12/03/2021 UP TO 14:00 HRS. IST**
iv)	PRE-BID DISCUSSION **(IF REQUIRED**) ON	**N.A.**
v)	LAST DATE OF SUBMISSION OF OFFER	**15/03/2021 UP TO 14:00 HRS. IST**
vi)	DATE OF TECHNO-COMMERCIAL BID OPENING	**15/03/2021 AT 16:30 HRS. IST**

BHEL RESERVE THE RIGHT TO ACCEPT/REJECT ANY OR ALL THE BIDS WITHOUT ASSIGNING ANY REASON THEREOF.

NOTE: PRE-BID DISCUSSION, IF TAKE PLACE, SHALL FORM PART OF THE TENDER DOCUMENT. NO CLARIFICATIONS/QUIERIES FROM THE TENDERERS AFTER 12/03/2021 (UP TO 14:00 HRS. IST) OR AFTER PRE-BID DISCUSSION (IF TAKES PLACE) SHALL BE ENTERTAINED BY BHEL.

ENCLOSURES: -

i) **SCOPE OF WORK, TAXES AND DUTIES & OTHER DETAILS: (ANNEXURE-I: 21 PAGES)**

ii) ***SPECIFIC CLAUSE WITH RESPECT TO BOCW ACT & CESS ACT: (ANNEXURE-BOCW: 02 PAGES)***

iii) **FIELD WELDING SCHEDULE (06 PAGES)**

iv) **DRAWINGS (94 PAGES)**

v) **LIST OF THE T & Ps AND MMDs TO BE PROVIDED BY THE CONTRACTOR (ANNEXURE-II: 03 PAGES)**

vi) **MAJOR CONSUMABLES TO BE ARRANGE D BY THE CONTRACTOR (ANNEXURE-III: 01 PAGE)**

vii) **ANNEXURE FOR HSE PLAN VIDE DOC. NO. HSEP:14-ER (REV.: 01 DTD. 08/05/20- 170 PAGES) WITH OCP DOC. NO. HSE OCP: 61 (REV. NO.: 01 DTD. 01/06/20 -13 PAGES) & HSEOSP: 61A (REV. NO.: 00 DTD. 27/04/20 -03 PAGES)**

viii) **GENERAL & SPECIAL CONDITIONS OF CONTRACT FOR SERVICES JOB (24 PAGES)**

ix) **SPECIFIC TERMS AND CONDITIONS FOR SERVICES JOB (14 PAGES)**

x) **NO DEVIATION CERTIFICATE AS PER PRESCRIBED FORMAT (ANNEXURE-IV)**

xi) **PRE-QUALIFICATION CRITERIA (ANNEXURE-V)**

xii) **DECLARATION OF THE BIDDERS (ANNEXURE-VI)**

xiii) **DECLARATION OF RELATED FIRMS AND THEIR AREA OF ACTIVITIES (ANNEXURE-VII)**

xiv) **PRICE SCHEDULE**

xv) FORMAT FOR BANK GUARANTEE FOR PERFORMANCE SECURITY

xvi) FORMAT FOR PROFORMA OF BANK GUARANTEE (in lieu of SECURITY DEPOSIT)

xvii) RTGS FORMAT (REAL TIME GROSS SETTLEMENT)

xviii) SUSPENSION OF BUSINESS DEALING WITH SUPPLIERS/CONTRACTORS - ANNEXURE-A

xix) FORMAT FOR CERTIFICATE BY CHARTERED ACCOUNTANT ON LETTER HEAD - ANNEXURE-B

xx) BANKRUPTCY/ LIQUIDATION UNDERTAKING-ANNEXURE-C

xxi) FORMAT FOR DECLARATION FOR RELATION IN BHEL

xxii) FORMAT FOR SEEKING CLARIFICATION

xxiii) FORMAT FOR DETAILS OF BIDDER

xxiv) FORM-1 (FORMAT FOR LOCAL CONTENT)

xxv) FORM-2

xxvi) RTGS DETAILS OF BHEL-PSER FOR EFT BY BIDDER/CONTRACTOR

xxvii) INTEGRITY PACT AGREEMENT FORMAT

ALL THE PAGES OF NIT SHALL BE DULY SIGNED BY THE BIDDER WHILE SUBMITTING THE OFFER.

For & on behalf of
BHARAT HEAVY ELECTRICAL LIMITED

DY. MANAGER (PURCHASE)

PARTICULARS OF THE TENDER

A) E-TENDER NUMBER : **PSER:PUR:BRH-S434:20 (ENQ:20:PP:0015:PUR:88) Date 05/03/2021.**

B) WORK : **"ERECTION, TESTING & COMMISSIONING OF LTRH PENDENT COILS BANK, LTRH HORIZONTAL COILS BANK, ECONOMISER HORIZONTAL COILS BANK, LIFTING OF ECONOMISER OUTLET HEADER, REPLACEMENT OF 8 NOS. SEPARATOR SAFETY VALVE, SHORTENING OF LENGTH OF FSH REAR COIL ASSY., REMOVAL OF 3 PLATEN ASSEMBLIES (9TH, 17TH & 25TH FROM BOILER LEFT SIDE TO BE REMOVED) FROM PSH ASSY. & 144 HEADER END PLUGS/BLANKED ARE TO BE INSTALLED, WELDED AT THE END OF HEADER NIPPLES OF PSH ALONG WITH CUP LOCK SCAFFOLDING ARRANGEMENT AND ERECTION & DISMANTLING UPTO BOTTOM OF PSH, ALONG WITH CONNECTED ACCESSORIES AND HYDRAULIC TEST OF THESE NEW COILS ALONG WITH OTHER RELATED CIRCUITS OF BOILER, AH SOOT BLOWER PIPING & SUPPORTS, EXTENDED BACK PASS BOTTOM SUPPORTS, ECONOMISER ANTI VIBRATION BAFFLES & CASTABLE REFRACTORY FOR EXTENDED BACK PASS PANEL AT 2X660 MW NTPC BARH STAGE-II, U#5, BARH, PATNA, BIHAR".**

C) TENDER SUBMISSION DUE DATE : **ON 15/03/2021 UP TO 14:00 HRS. IST**

D) TECHNICAL BID OPENING DATE : **ON 15/03/2021 AT 16:30 HRS. IST**

E) PRICE BID OPENING : ……...

F) VALIDITY OF OFFER : Six months from the due date of offer submission (Including extension, if any)

G) MOBILIZATION TIME : **As per Annexure-I**

H) COMPLETION PERIOD : **As per Annexure-I**

I) TARGET COMPLETION DATE : ……

J) The vendors should furnish the following documents for our scrutiny along with papers for pre-qualification for qualifying for price bid opening.

1) Credential / Experience certificates in line with Pre-Q & requirements in line with tender specifications
2) PAN NO & Photo Copy of PAN CARD.
3) Photo Copy of GSTN Registration Certificate.
4) Latest Banker's certificate for financial soundness.
5) Balance sheets & P&L Accounts for the preceding three years
6) Organizational chart
7) Relevant list of T&P held by the vendor earmarked for the tendered job
8) List of concurrent contracts held by the Contractor.

ANNEXURE-VI

DECLARATION OF THE BIDDERS

Job: "ERECTION, TESTING & COMMISSIONING OF LTRH PENDENT COILS BANK, LTRH HORIZONTAL COILS BANK, ECONOMISER HORIZONTAL COILS BANK, LIFTING OF ECONOMISER OUTLET HEADER, REPLACEMENT OF 8 NOS. SEPARATOR SAFETY VALVE, SHORTENING OF LENGTH OF FSH REAR COIL ASSY., REMOVAL OF 3 PLATEN ASSEMBLIES (9TH, 17TH & 25TH FROM BOILER LEFT SIDE TO BE REMOVED) FROM PSH ASSY. & 144 HEADER END PLUGS/BLANKED ARE TO BE INSTALLED, WELDED AT THE END OF HEADER NIPPLES OF PSH ALONG WITH CUP LOCK SCAFFOLDING ARRANGEMENT AND ERECTION & DISMANTLING UPTO BOTTOM OF PSH, ALONG WITH CONNECTED ACCESSORIES AND HYDRAULIC TEST OF THESE NEW COILS ALONG WITH OTHER RELATED CIRCUITS OF BOILER, AH SOOT BLOWER PIPING & SUPPORTS, EXTENDED BACK PASS BOTTOM SUPPORTS, ECONOMISER ANTI VIBRATION BAFFLES & CASTABLE REFRACTORY FOR EXTENDED BACK PASS PANEL AT 2X660 MW NTPC BARH STAGE-II, U#5, BARH, PATNA, BIHAR".

01. I, ……...hereby certify that all the information and data furnished by me with regard to this **E-Tender No. PSER: PUR:BRH-S434:20 (ENQ:20:PP:0015:PUR:88) Date 05/03/2021** are true and complete to the best of my knowledge.

02. I have gone through the tender specifications, scope of work, terms and conditions mentioned in Annexure as well as General and Special conditions of contract and various stipulations in detail and agree to abide by them and comply with the requirements and intent of specifications.

03. I also certify that there have been no deviations from the tender requirements in the bid submitted against this tender.

04. I further certify that I am duly authorized representative of the under mentioned tenderer and hold a valid power of attorney to this effect, a copy of which is enclosed.

Signature:

Name :

Date :

Designation :

Seal :

Tenderers Name and address

ANNEXURE-VII

DECLARATION

Date: ----------

Job: "ERECTION, TESTING & COMMISSIONING OF LTRH PENDENT COILS BANK, LTRH HORIZONTAL COILS BANK, ECONOMISER HORIZONTAL COILS BANK, LIFTING OF ECONOMISER OUTLET HEADER, REPLACEMENT OF 8 NOS. SEPARATOR SAFETY VALVE, SHORTENING OF LENGTH OF FSH REAR COIL ASSY., REMOVAL OF 3 PLATEN ASSEMBLIES (9TH, 17TH & 25TH FROM BOILER LEFT SIDE TO BE REMOVED) FROM PSH ASSY. & 144 HEADER END PLUGS/BLANKED ARE TO BE INSTALLED, WELDED AT THE END OF HEADER NIPPLES OF PSH ALONG WITH CUP LOCK SCAFFOLDING ARRANGEMENT AND ERECTION & DISMANTLING UPTO BOTTOM OF PSH, ALONG WITH CONNECTED ACCESSORIES AND HYDRAULIC TEST OF THESE NEW COILS ALONG WITH OTHER RELATED CIRCUITS OF BOILER, AH SOOT BLOWER PIPING & SUPPORTS, EXTENDED BACK PASS BOTTOM SUPPORTS, ECONOMISER ANTI VIBRATION BAFFLES & CASTABLE REFRACTORY FOR EXTENDED BACK PASS PANEL AT 2X660 MW NTPC BARH STAGE-II, U#5, BARH, PATNA, BIHAR".

E-Tender No.: PSER:PUR:BRH-S434:20 (ENQ:20:PP:0015:PUR:88) Date 05/03/2021.

To: ---

Address: BHEL, ----------

Email: ---

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

Dear Sir/Madam,

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----------

Supplier Code: ----------

Address: ----------

Annexure-I

SCOPE OF WORK

JOB DESCRIPTION: ERECTION, TESTING & COMMISSIONING OF LTRH PENDENT COILS BANK, LTRH HORIZONTAL COILS BANK, ECONOMISER HORIZONTAL COILS BANK, LIFTING OF ECONOMISER OUTLET HEADER, REPLACEMENT OF 8 NOS. SEPARATOR SAFETY VALVE, SHORTENING OF LENGTH OF FSH REAR COIL ASSY. REMOVAL OF 3 PLATEN ASSEMBLIES(9TH,17TH &25TH FROM BOILER LEFT SIDE TO BE REMOVED) FROM PSH ASSY. & 144 HEADER END PLUGS/BLANKED ARE TO BE INSTALLED ,WELDED AT THE END OF HEADER NIPPLES OF PSH ALONG WITH CUP LOCK SCFFOLDING ARRANGEMENT AND ERECTION &DISMANTLING UPTO BUTTOM OF PSH, ALONG WITH CONNECTED ACCESSERIES AND HYDRAULIC TEST OF THESE NEW COILS ALONG WITH OTHER RELATED CIRCUITS OF BOILER, AH SOOT BLOWER PIPING & SUPPORTS, EXTENDED BACK PASS BOTTOM SUPPORTS, ECONOMISER ANTI VIBRATION BAFFLES & CASTABLE REFRACTORY FOR EXTENDED BACK PASS PANEL AT 2X660 MW NTPC BARH STAGE-II, U#5, BARH, PATNA (BIHAR)

JOB DURATION:75 DAYS: (Shutdown period of 65 days with a grace period of 10 days)

Name of the work:- Retrofitting (*ERECTION, TESTING & COMMISSIONING)* work of LTRH pendent coil Assembly, LTRH Horizontal coil assembly, Eco Coil Assembly, Lifting of Economiser coil assembly and lifting of Economiser outlet header by 150 mm along with installation/relocations of LRSB (with associated electrical and C&I work) and manhole doors, replacement of 8 no separator safety valves, shortening of length of FSH rear coil assembly , removal of 3 platen assemblies (9^{th},17^{th} & 25^{th} from boiler left side to be removed) from Platen Super heater & blanking of PSH inlet & out let header nipples along with connected accessories and hydraulic test of these new coils along with other related circuits of Boiler, AH soot blower piping & supports, extended back pass bottom supports, economiser anti vibration baffles & castable refractory for extended back pass panel in one boiler
Detailed Scope of work covers the following:-

(a) Erection of 101 nos. of additional LTRH Pendent coil assembly in line with existing LTRH pendent coil assembly in 2nd pass of the boiler. The size of the coil tube is 63.5X5 mm and spec of material is SA213 T91.
(b) Erection of 101 nos. of additional LTRH Horizontal coil assembly in line with existing LTRH upper horizontal coil assembly in 2nd pass of the boiler. The size of the coil tube is 63.5 X 4.57 mm and spec of material is SA213 T91.
(c) Lifting of economiser header from its existing elevation to higher elevation by 350 mm/as per revised drawing. The present elevation of the Eco outlet header is 56425 mm and to be lifted at an elevation 56775 mm.
(d) Erection of (101 Pair + 1No) 203 nos. of additional eco coil assembly in 2nd pass of the boiler. The size of the eco coil tube is 44.5X8 mm and spec of material is SA210 Gr. C.
(e) Replacement of 8 no Separator Safety Valve.
(f) Shorthening of length of 101 FSH Rear Coil assembly.
(g) Removal of 3 platen assemblies (9^{th},17^{th} &25^{th} from boiler left side to be removed) 144platen inlet and outlet term tubes to be removed of PSH coil assembly and blanking of PSH header nipple with supplied blanks .
(h) Installation of new manhole doors (06 to be installed newly and 02 to be relocated).Installation of 16 Nos. of LRSB (12 new LRSB and 04 existing LRSB to be relocated). Making of additional platform for LRSB.
(i) AH Soot Blower Piping & Supports.
(j) Extended back pass bottom supports.
(k) Economizer Anti vibration baffles.
(l) Castable Refractory Application for extended back pass panel.

(m) Supply & application of touchup/finish painting for Newly Erected Structure, Restored Structure, Buckstay, Floor Members etc.

(n) Cable laying, cable termination,ferulling,dressing, panel erection,Testing, Commissioning & All Electrical & C&I work related to 12 No Newly Erected LRSB & 4 No Relocated LRSB.

1. Description of work before shutdown (Preparatory work OR Pre Shutdown work):-.

(A) Identification and segregation of LTRH pendent, LTRH Horizontal, Economiser Horizontal coils, LRSB, Profile tubes, doors etc with respect to their respective position from Centre to both sides for as per their sequence of erection with attachment materials for successful installation of Additional banks of these coils, AH soot blower pipes & Supports,

(B) Making arrangement for transportation, loading and unloading of identified/ sequentially segregated coils along with other materials (LRSBs & Profile tubes etc) from BHEL yards to Erection Site.

(C) Make arrangement for steam cleaning & sponge test of all the newly received coils and profile tubes (for LRSB & doors opening) and ensure the cleanliness of the tube. After sponge test, ensure putting the end caps in each tube. For steam cleaning, vendor has to lay steam pipeline from nearby unit/point within their quoted price & after completion of the same, it is to be dismantled (pipes for the same will be provided by BHEL).

(D) Fixing of cassette baffles, tube shields, and other attachments (whichever is possible to do at ground) over the coils or loose tubes.

(E) Cutting of existing Platform suitably to facilitate the coil feeding up inside BP furnace. Same has to be restored after completion of erection.

(F) Making additional platform @ 70.5M both side of BP for stacking of LTRH pendent Coils for erection and to facilitate the erection of pendent coils. Shifting of structural steel materials at respective floor elevations to make additional platform for LRSB (New and relocated). The drawings and documents shall be furnished by BHEL-Trichy. The arrangement for the shifting of structural steel to be made by vendor.

(G) Making suitable arrangement from both side (as per site condition) of Boiler for lifting and shifting of coils by using load tested winch/crane with all pulleys in position, from Boiler zero meter to @ 70.5 Mtr Platform for stacking and further erection of LTRH Pendent coils The erection arrangement (for coils, structures, pr. Parts etc) to be made by vendor, has to be tested at site through testing agency.

(H) Shifting of coils from ground and stacking at coil handling platform at an elevation 48.9M as per their order of erection as much as possible. Similarly, profile tubes/panel for opening of LRSB and doors have to be shifted at their respective locations.

(I) Making suitable arrangement from both side (as per site condition) of Boiler for lifting and shifting of ECO coils/LTRH horizontal coils by using load tested winch/crane with all pulleys in position, from boiler zero meter to Eco handling Platform @ 48.9M and to further shifting from an elevation 48.9M to 55 M for further erection of Eco coils & From 48.5 Mtr to 73 Mtr for further rection of LTRH Horizontal coil assy. The erection arrangement (for coils, structures, pr. Parts etc) to be made by vendor, has to be tested at site through testing agency.

(J) Installation of welding booth with adequate nos. of welding machines/ rectifier/ thyristor based (refer T&P list) at a floor convenient to joint locations. Vendor has to arrange to draw cables from provided source of construction power by BHEL/Customer.

(K) Installation of adequate nos. heating panels/ low voltage heating panels with temperature recorders at convenient place before start of welding job (refer T&P list, as provided by vendor.

(L) Arrangement for qualification test of HP welders for HP joints/ Attachment welding/structural welding. Test piece shall be provided by BHEL.

(M) Welding of additional structure as may be required (left and right side of BP side wall) for making additional arrangement to transfer the load of coils during cutting of hanger tubes OR vendor may suggest alternate arrangements for transferring the load of existing coils and same may be finalized and implemented after reviewed by BHEL/Customer.

(N) Making steel structure arrangements for the Eco outlet links locking during cutting of links. However, links shall be locked after shut down of unit. Prior arrangement to be made in advance.

(O) Supply and application of finish painting/touch up painting (as per BHEL standard/ BHEL painting Manual) to be done for the newly erected platform & for the relocated platform (where ever required).

Note: i) Above mentioned scope is tentative.

ii) If any activity as mentioned above under Pre Shutdown activities, couldn't be completed/taken up during pre-shutdown period, the same has to be completed by vendor with additional resources within the shutdown period.

2. Description of work after shut down (Shut down Period):-

2.1 Work for erection of LTRH Pendent assemblies (101 nos.) in Shutdown period:-

2.1.1 After clearance from customer (water wash of boiler, for which vendor may have to get associated and takeover the Boiler after water washing), cutting of BP side wall from 87M to 69M or as directed by BHEL/Customer engineers. This work involves removal of sheeting and insulation from BP side wall on both sides and cutting and removal of buckstay (preferably 05 nos. of buckstay to be cut and removed with associate leveler guide with a span of approx 02M length on both sides of BP wall) OR as per BHEL instruction. After cutting and removal of buckstay, steam cooled finned wall panel to be cut (from 87M to 69M or as per suitability to ease in erection of pendent coils). The BP side wall is to be cut in such a way, to reinstall the same without any problem. The wall is to be preferably cut in 02 parts or as per convenience. The arrangement for lifting and removal of cut panel to be done in advance.

2.1.2 Roof penthouse enclosure top deck to be cut throughout the width of the boiler in the region of new pendent and existing pendent coils to facilitate the erection of LTRH pendent coils. This work involves making scaffolding in the overhead of the penthouse enclosure top deck and removal of 360 mm thick LRB wool insulation in overhead condition followed by cutting of 6mm roof deck sheet. After completion of erection of LTRH pendent coil assemblies, same has to be restored.

2.1.3 Roof penthouse enclosure side deck (both side) to be cut in a span of approx 03M width to make lifting arrangement of LTRH pendent coils and to facilitate erection of same. This work involves removal of 250 mm thick pourable insulation over penthouse side deck followed by cutting of deck sheet and enclosure frame. Same has to be restored (with application of pourable insulation and LRB wool) after completion of erection of new LTRH pendent coil assembly.

2.1.4 Making arrangement for lifting and shifting of LTRH pendent coils from 70.5M elevation to inside of the boiler. As per convenient, coils shall be erected from center to both sides. Simultaneously, parallel arrangement is required for positioning of new pendent coil after placement at its place and to take the load of coils till transferring the load on permanent crown plate assembly.

2.1.5 Cutting of BP roof fin weld panel in the vicinity of new LTRH pendent coils place, to clear the space to accommodate the new pendent coils. This work involves making arrangement of scaffolding in overhead of BP roof for cutting of roof panel tubes (at 02 places for cutting). There are such 204 tubes (which need to cut at 02 places) to be cut and restore after completion of the erection of LTRH new pendent coils. Roof tubes to be cut in such a way to re install without any problem after finishing of LTRH pendent coil erection.

2.1.6 Making arrangement for the transfer of load by means of wire rope/ chain pulley blocks of the existing LTRH pendent coils OR by any other means (depending up on the suitability during the execution of

the job) (by 5th days from shutdown) over the PPSL structural steel while cutting of existing LTRH. Since all the existing coils to be cut at a time to clear the space for new Pendent assembly, therefore load transfer arrangement is required for 101 nos. of coils altogether.

2.1.7 Cutting of portion of existing LTRH Pendent coils (Preparation for cutting shall be started by 1st day of shutdown and to be finished by 7th day from shutdown) to clear the space to accommodate the new LTRH along with Horizontal LTRH. New pendent coils shall be erected only after cutting and removal of existing LTRH portion from 76M to 69M or as directed by BHEL /Customer engineer. This 101 coils (each coil contain 08 tubes) to be cut at 02 places and to be removed from inside BP immediately. The size of the coil tube is 63.5X4 mm and spec of material is SA213 T91 and needs scaffolding arrangement for cutting at 76M elevation at minimum 03 places for cutting of existing tubes and welding of the new joints after erection of new pendent (scaffolding is to be made in such a way to use same scaffolding to complete entire work without disturbing erection of LTRH pendent assembly or other assembly). There may be requirement of additional arrangement for handling of cut portion of tubes (approx. 07M in length and bend portion) while cutting & removing from BP furnace. Adequate Nos. of grinders (minimum 10) to be deployed in parallel for cutting of such 1616 joints. However, since removal of cut tubes of 7m length (approx.) has to be removed sequentially from one side, balance tubes to be cut keeping 4-5 mm tube to tube parent material uncut which will be cut just prior to removal in sequence.

2.1.8 Erection of new RB rows (02 nos.) at PPSL level for loading of new pendent assembly and strengthen of existing RBs/ WBs.

2.1.9 Alignment of the erected new pendent coils (with respect to joint fit up with existing pendent coil tubes & new LTRH horizontal coil tubes and elevation) to be done.

2.1.10 Assembly and erection of crown plates with tie rods. Crown plates to be assembled, erected and fixed in line with restoration of BP roof joints and alignment of the coils altogether. There are such 7-8 crown plate assemblies of (12-13 coils in 01 crown plate assembly) to be done. The crown plate materials probably of GR-12 & Gr-22. Vendor has to arrange for heat treatment during welding of crown plates/end bar as per specification/WPS.

2.1.11 Application of refractory followed by skin casing plates in the area of new pendent LTRH to be done to seal the roof (after Hydro test OR after NDT completion, as will be mutually decided).

2.1.12 Erection of Mechanical seal band after erection alignment and joint completion of new LTRH pendent assembly at 04 elevations. It is preferred to start the job immediately after completion of part assembly (out of 101) in parallel. Additional scaffolding shall be required at different elevations.

2.1.13 Fixing of MTM pads/acromats along with associated C&I work (as may be required) to be done.

2.1.14 Tube protection/erosion shield to be fixed on the pendent assembly tubes as per drawing.

2.1.15 Balance restoration of roof enclosures to be done.

2.1.16 Erection of Structural steel at PPSL level for strengthening of existing WB/RB and installation 2 nos. of new RB row for new LTRH pendent coils. Supply and application of finish/touchup paint for these structural members.

2.1.17 For Hydrotest of RH Circuit, vendor has to fit RH isolating device in RH Isolator (2 nos. HRH isolator & 2 nos. CRH isolator). After completion of Hydrotest, the Isolating device are to removed & RH isolators are to be boxed up as per instructions of BHEL Engineer.

2.2 <u>Work for erection of LTRH Horizontal assemblies (101 nos.) in Shutdown period:-</u>

2.2.1 After clearance from customer (water wash of boiler, for which vendor may have to get associated and takeover the Boiler after water washing), cutting of BP Rear wall from 69M to 74M or as directed by BHEL/Customer engineers. This work involves removal of sheeting and insulation from BP rear wall and cutting and removal of buckstay (preferably 03 nos. of buckstay to be removed with associated

leveler guide from throughout of width of the BP rear wall panel) as per BHEL instruction. After removal of buckstay, steam cooled finned wall rear panel to be cut (from 69M to 74M or as per instruction of BHEL). The BP finned panel rear wall consisting of 204 tubes of 44.5X8mm SA213 Gr-12 is to be cut preferably in sets of 08 tubes (maximum) locally at prescribed places (maximum at 04 locations as per BHEL-Trichy guidelines) to enable insertion of LTRH horizontal coil assembly. The new openings for insertion of coils are to be made only after restoration of existing openings (or as per BHEL instruction). The nos. of opening and places where openings to be made shall be mutually decided during finalization of schedule as per note-2. This job required arrangement of scaffolding for cutting and re-welding of the BP rear wall tubes.

2.2.2 Making arrangement for the transfer of load of the existing coil banks (04 nos. of LTRH & 03 Nos. of ECO), during hanger tubes cutting for insertion of LTRH new horizontal banks by means of wire rope and chain pulley blocks (The arrangement may be made of wire rope, tied from left to right across the BP width (the anchoring of these wire ropes to be done with the additional structure made in LHS & RHS of the boiler for same purpose (refer point no-1 (M) against work prior to shutdown) OR by other alternate arrangements suggested by vendor as detailed in clause no-1 (M). This arrangement should be of enough strength to take the load of at least 04 set of coil banks simultaneously. Each coil bank having weight of approx 20 MT.

2.2.3 Arrangement of wire rope and chain pulley blocks to be made for shifting of coils from outside of furnace to inside of BP furnace from the opening in Rear wall. This needs to tying of minimum 04 Nos. of wire rope with chain pulley blocks across the BP depth (rope placement shall be done in such a way to shift the maximum nos. of coils from a single opening).

2.2.4 After transferring the load of existing coils (minimum 04 coil set at a time) over arrangement made by vendor, hanger tubes to be cut for clear the passage for the new horizontal LTRH coils. The nos. of hanger tubes per coil set is 04 and total nos. of hanger tube is 408 (57.2X12.7 mm and spec is SA213 T12). Each hanger to be cut at 02 places (69.8M and at 73.024M). For cutting of hanger at 73M, scaffolding arrangement to be made and immediately to be removed after cutting and edge preparation of same for insertion of new LTRH coils.

2.2.5 After insertion of new horizontal LTRH coils at its position with respect to joint with new pendent coils and existing upper LTRH horizontal coil altogether, hanger to be weld on very first priority to release the load permanently on hanger tube and to transfer the load of next set of coils for same activities as detailed above.

2.2.6 After completion of erection and welding of all hanger tubes of 101 coils, mechanical spacer to be fixed.

2.2.7 After completion of erection of all new LTRH horizontal coils and welding of BP rear wall with fins welding completion (shall be done in parallel with completion of erection of new LTRH horizontal coil erection in corresponding areas), buckstay restoration is to be done followed by application of refractory (as per drawing), insulation pin welding, application of insulation and sheeting (Insulation shall be done after Hydro test OR after NDT completion, as will be mutually decided).

2.3 <u>Work of Lifting of Economizer outlet header by 350 mm in Shutdown period:-</u>

2.3.1 Locking and cutting of Eco Outlet links (In LHS and RHS) preferably in straight portion of the link or as directed by BHEL/Customer to prevent it from rolling after cutting. This work involves removal of insulation over the links, locking with additional structural arrangement. The dimension and material specification of eco outlet is 508 X 71.5 mm mm and SA106 Gr. C respectively.

2.3.2 Making arrangement for the load transfer and lifting of ECO outlet links after making free it from all existing joint cutting. For the arrangement preferably ISMB 500 beams to be placed (at 02 places) over existing LTRH upper/upper intermediate coils. Since, the ECO O/L header length is approx 21M, therefore to transfer the load of ECO O/L header, 10 ton chain block to be placed at 4-5 places anchored

with ISMB placed over existing LTRH upper coil. Same arrangement is to be used for lifting of ECO outlet header by 350mm. Eco O/L header to be lift along with all associated arrangement of header suspension system (viz collector channel, U rod etc).

2.3.3 Cutting of BP side walls on both side for making opening for lifting of ECO O/L header by 350 mm. this work involve removal of sheeting & insulation and cutting of tubes at 02 places (elevation as decided by BHEL). Preferably 09 tubes (each side) to be cut and re weld with the supplied profile tube.

2.3.4 Cutting of existing joints of Eco outlet header stub and eco outlet terminal tubes (44.5X8mm, spec- SA-210 Gr. C). For cutting of existing joints (812 nos.) scaffolding arrangement to be made suitably for cutting of existing and welding of the new joints.

2.3.5 After fixing of Eco outlet header at new elevation (+56775 MM) load of the header to be transferred over the permanent hanger tube arrangement of the header. For transferring the load over the hanger suspension system, rest clits plate (125X30X12 mm and SA387 Gr-22 Cl-2) to be welded over the hanger tubes corresponding to the new elevation of header.

2.4 Work for erection of Economizer Horizontal coils assemblies (101 nos.) in Shutdown period:-

2.4.1 After clearance from customer (water wash of boiler, for which vendor may have to get associated and takeover the Boiler after water washing), cutting of BP Rear wall from 56 M to 53.6 M or as directed by BHEL/Customer engineers. This work involves removal of sheeting and insulation from BP rear wall and cutting and removal of buckstay (preferably 02 nos. of buckstay to be removed with associated leveler guide from throughout of width of the BP rear wall panel) as per BHEL instruction. After removal of buckstay, steam cooled finned wall rear panel to be cut (from 56 M to 53.6 M or as per instruction of BHEL). The BP finned panel rear wall consisting of 204 tubes of 44.5X8mm SA213 Gr-12 is to be cut preferably in sets of 08 tubes (Maximum) locally at prescribed places (maximum at 04 locations as per BHEL-Trichy guidelines) to enable insertion of Eco horizontal coils assembly. The new openings for insertion of coils are to be made only after restoration of existing openings OR as per BHEL Instruction). The nos. of opening and places where openings to be made shall be mutually decided during finalization of schedule as per note-2. This job required arrangement of scaffolding for cutting and re-welding of the BP rear wall tubes.

2.4.2 Making arrangement for the transfer of load of the existing coil banks (03 Nos. of ECO coil bank), during hanger tubes cutting for insertion of new Eco horizontal Coil banksby means of wire rope and chain pulley blocks (The arrangement shall be made of wire rope, tied from left to right across the BP width (the anchoring of these wire ropes to be done with the additional structure made in LHS & RHS of the boiler for same purpose (refer point no-1.M against work prior to shutdown) OR by other alternate arrangements suggested by vendor as detailed in clause no-1.M. This arrangement should be of enough strength full to take the load of at least 04 sets of coil banks simultaneously. Each coil bank having weight of approx 15 MT.

2.4.3 Arrangement of wire rope and chain pulley blocks to be made for shifting of coils from outside of furnace to inside of BP furnace from the openings in Rear wall. This needs to tying of minimum 04 Nos. of wire rope with chain pulley blocks across the BP depth (rope placement shall be done in such a way to shift the maximum nos. of coils from a single opening).

2.4.4 Cutting and removal of the existing Eco O/L terminal tubes by cutting the existing joint with existing upper Eco coils to free the space for insertion of new ECO horizontal coil assembly. Total nos. of joints to be cut is 812 and removal of same no of tubes.

2.4.5 After transferring the load of existing coils (minimum 04 coil set at a time) over arrangement made by vendor, hanger tubes to be cut for clear the passage for the new horizontal Eco coils. The nos. of hanger tubes per coil set is 04 and total nos. of hanger tube is 408 (57.2X12.7mm and spec is SA213 T12). Each hanger to be cut at 02 places (at 53.7M and at 55M OR as per Drawing). For cutting of

hanger tubes, scaffolding arrangement to be made and immediately to be removed after cutting and edge preparation of same for insertion of new Eco horizontal coils.

2.4.6 After insertion of new horizontal Eco coils at its position with respect to joint with existing upper Eco horizontal coil, hanger tubes to be welded on very first priority to release the load permanently on hanger tubes and to transfer the load of next set of coils for same activities as detailed above.

2.4.7 After completion of erection and welding of all hanger tubes for (101 Pair + 1No) 203 nos coils, mechanical spacer to be fixed.

2.4.8 After completion of erection of all new Eco horizontal coils and welding of BP rear wall with fins welding completion (shall be done in parallel with completion of erection of new Eco horizontal coil erection in corresponding areas), buckstay restoration is to be done followed by application of refractory (as per drawing), insulation pin welding, application of insulation and sheeting (Insulation shall be done after Hydro test OR after NDT completion, as will be mutually decided).

2.5 Miscellaneous work (erection of profile tubes for doors and LRSBs) in Shut down period:-

2.5.1 Making scaffolding/temporary arrangement for removal of sheet/ insulation over the BP wall for marking/cutting/edge preparation/welding of profile tube/panels (Wall to be cut for LRSB opening shall be given by BHEL/Customer as per the locations).

2.5.2 Fixing of seal box with all attachments for doors/LRSB.

2.5.3 Removal of 04 nos. of installed LRSB which needs to be relocated and arrangement to be made for relocation/shifting of LRSB.

2.5.4 Installation of 12 no new LRSB and 4 no relocated LRSB with all support.

2.5.5 Installation of 6 no new manhole doors & relocation of 2 nos existing door.

2.5.6 Relecotionn of Instrument points in Economiser area (2 nd pass staem cooled wall)

2.5.7 Connection of soot blower piping to the newly installed LRSB (the size of the pipe for soot blower piping is 60.3X5.54 mm and materials specification is SA335 P22).

2.5.8 1 no panel erection in control room for LRSB, new cable laying from control room to individual LRSB"s, cable termination, cable glanding, dressing, ferruling etc for 12 no new LRSB's & reconnecting/relaying of existing cable with 4 no relocated LRSB..

2.5.9 Testing and commissioning of LRSB along with allied electrical/ C&I job.

2.6 Work for reduction of Length of Final SH Coil Rear Bank (101 nos coil assy) & removal of 3 platen assemblies(9th,17th & 25th from boiler left side to be removed) 144 platen inlet and outlet term tubes to be removed close to header and blanking in PSH Header nipple during shutdown period :-

2.6. a.FSH WORK:

The scope covers shortening of FSH Rear Coll Assy. Length (for all 101 nos. coils) by cutting & removal of straight tube from FSH Rear Coil Assy, re-welding of Bottom loop of coil in new position (refer attached tentative sketch)

2.6.a.1 After clearance from customer (water wash of boiler, for which vendor may have to get associated and takeover the Boiler after water washing), scaffolding to be made in Final SH Rear Bank as per requirement/as directed by BHEL.

2.6.a.2 This work involves removal of sheeting and insulation from BP side wall on both sides and cutting of BP side wall tubes for making arrangement of final SH rear Coil Assy straight portion cutting & removal (as per drawing), arrangement for creating gap between FSH coils for cutting of coils,removal of straight tube, re welding of old bottom loops in new position etc. OR as per BHEL instruction. The BP side wall is to be cut in such a way, that it can be reinstalled without any problem. The arrangement for lifting and removal of cut

tubes/panel to be done in advance.Arrangement of any temporary arrangement /scaffolding under vendor scope.

Note: For shortening of FSH Rear Coll Assy Length (for all 101 no coils) by cutting & removal of straight tube from FSH Rear Coil Assy, re-welding of Bottom loop of coil in new position, if any other job to be carried out (which is not mentioned here), vendor has to carry out the same within their quoted price (without any extra cost).

2.6.a.3. Gap to be created in FSH rear coils in multiple location for parallel work. Length of existing FSH rear coil assy is 17275 mm (approx). Approximately 8080 mm height to be reduced & removed from existing FSH rear coil assy. (as per drawing). Before cutting, coils are to be locked (if required), support in bottom loop to be taken. Cutting of FSH coils in 2 location as per drawing, removal & disposal of staright spool tubes from coils, bottom loop portion to be kept in goose neck area or to be taken outside floor, the loop tube ends to be caped, before fit up, the bottom loops to be cleaned with air/steam and sponge test, fitup of bend portion of coils in new position (after reduction of coil length), Pre-Heat, welding, PWHT & NDT as per Erection Welding Schedule/WPS.

2.6.a.4 Alignment of the FSH coils to be done after reduction of length.

2.6.a.5 Restorationm of Mechanical seal band after erection alignment and joint completion of FSH rear coil assembly as per drawing.

2.6.a.6 Remove portion from Final SH Rear Coil assy. After removal of straight tubes from boilers, the same to be transported to customer store or any other location as directed by BHEL and The bottom bend portion to be re-ertected, welded again as per drawing.

2.6.a.7 Final SH modification will require tentatively following welds joints:

- 44.45 X 7.1 – SA213TP347H : 808 Nos.
- 44.45 X 7.6 – SA213TP347H : 808 Nos.
- APPLICABLE NDT : 20% RT
- Weld joint of tubes(for restoration of Water wall tube, any other tube if cut for making arrangement for shortening FSH coil length) its PH,PWHT,NDT as per EWS/WPS of BHEL

b. PSH WORK:

The scope coveres removal of 3 platen assemblies (9th,17th & 25th from boiler left side to be removed) 144 platen inlet and outlet term tubes to be removed close to header & 144 (72-SA182F22CL3 &72-SA182F91)header end plugs are to be installed to be welded at the of header nipples. (refer Drawing).

2.6.b.1 After clearance from customer (water wash of boiler, for which vendor may have to get associated and takeover the Boiler after water washing), scaffolding to be made in Platen SH Coil assy. Scaffolding in PSH coil from Coil Bottom to Roof Tube Bottom as required to be made by vendor. The arrangement for removal of 3 platen assemblies of PSH coil to be done in advance.

2.6.b.2. This work may involve removal of sheeting and insulation from both side water wall, roof tube refractory/skin casing, seal band of crown plate (as required) and cutting of side water wall tubes, roof (as required) for making arrangement of Platen SH Coil Assy. 3 platen assemblies removal, arrangement for support for cutting of PSH coils assemblies as per drawing, locking of

PSH coils & loops (if reqd.), removal of 3 platen assemblies(9th,17th &25 from boiler left side to be removed), restoration of refractory, skin casing, seal band of crown plate etc. in roof area/water wall tube (as required) etc. OR as per BHEL instruction. After cutting of PSH coils assemblies, the same to be taken outside the boiler & disposed. Platen SH Inlet & outlet Heder nipples are to be blanked.

Note: For removal of 3platen assemblies(9th,17th &25th from boiler left side) & blanking of nipples of PSH Inlet & Outlet Header, if any other job to be carried out (which is not mentioned here), vendor has to carry out the same within their quoted price (without any extra cost).

2.6.b.3 PSH header nipples are to be blanked (with BHEL supplied blanks) after removal of coil assemblies.

2.6.b.4 After removal of 3platen assemblies of PSH male –female connectors/mechanical spacer etc of different area are to be re-fixed,welded.

2.6.b.5 Removal & Fixing of MTM pads/acromats along with associated C&I work (as may be required) to be done.

2.6.b.6 Balance restoration to be done.

2.6.b.7 Approximately 21.6 MT weight of coil assemblies to be removed from Existing Platenl SH coil assy. The removed elements to be taken outside the boiler & it is to be transported to customer store or to be disposed in location(inside plant premises) as directed by BHEL

2.6.b.8 Platen SH element removal work will require tentatively following weld joints:

Platen Superheater inlet header & outlet header nipples are to be blanked after removal of coil assemblies (9th,17th& 25th from boiler left side) (The maximum size of blank is of Dia 57.15mm & Minimum size is of 38.1mm will be provided by BHEL).

- GR22 blanks 72 Nos.,
  APPLICABLE NDT: 20% RT
  PH+PWHT: as per EWS/WPS of BHEL (to be provided during execution)
- GR 91 blanks 72 Nos.,
- APPLICABLE NDT: 100% RT or 20% RT &80 PAUT.
- PH+PWHT: as per EWS/WPS of BHEL (to be provided during execution).
- Weld joints of tubes (for restoration of Water wall tube, any other tube if cut for making arrangement for removal of Platen SH coil assemblies), its PH, PWHT, NDT as per EWS/WPS of BHEL.

c. Cuplock scaffolding for 1st pass for PSH modification work: Work under clause 2.6.b required cuplock scaffolding arrangement and erection & dismantling in first pass upto PSH bottom is also under vendor scope .

2.7 AH Soot Blower Piping & Supports:-

The scope covers

- Removal of existing Air heater Soot Blowing Steam Supply piping OD 60.3 X 5.54 (P22) – approximately 250 m along with the 6 Nos. of Valves
- Erection of new Air heater Soot Blowing Steam Supply piping OD 73 X 5.16 (P22) with necessary supports, 6 Nos. of Valves and application of insulation – approximately 250 m.
- The piping system is IBR (P-22) – approximate weight is 5 MT of Piping and Valves, 2.5 MT of Pipe Supports
- Hydro test of newly erected system.
- Insulation of newly erected portion.

The installation work to be carried out as per the drawings supplied by BHEL-Trichy. The job shall be carried out under the supervision of BHEL/ customer engineers. Any minor changes / alteration in the work at any stage for successful erection/completion of the piping have to be carried out after getting consent from BHEL/customer.

2.8 Extended back pass bottom supports:-

The scope covers

- Removal of Dog-house insulation and Refractory and suitable modification of existing enclosure below the extended back pass panel (approximately at an elevation of 65 metres).
- Installation of structures (beams, channels) as per the drawings supplied by BHEL Trichy.
- Vendor may have to carry out suitable scaffolding work to reach to the required level of extended back pass bottom for completion of this job. Necessary scaffolding work may be planned accordingly.
- The approximate weight is 20 MT.
- Restoration of Insulation/Refractory.
- Supply & application of Paints for structural work.

The installation work to be carried out as per the drawings supplied by BHEL-Trichy. The job shall be carried out under the supervision of BHEL/ customer engineers.

Any minor changes/ alteration in the work at any stage for successful erection of the system have to be carried out after getting consent from BHEL/customer.

2.9 Economiser Anti vibration baffles:-

The scope covers

- Installation of anti vibration baffles at 6 locations in the second pass of the boiler for all the four banks of economizer coils.
- The baffles are made of thin sheets of Carbon steel 3.15 mm, around 700-800 pieces to be pre-assembled and welded as per drawing.
- The approximate weight is 30 MT.
- Baffles other than top bank can be started immediately after getting shutdown. However, top bank is being newly inserted. Hence, vendor has to plan insertion of baffle plate in last 7-10 days of shutdown period.
- Vendor has to propose suitable arrangement for lifting / insertion of baffle plates and accordingly any erection space to be generated by cutting existing establishment like Eco duct, back pass wall has to be carried out by vendor including restoration of the same after completion of job within scope of work.

The installation work to be carried out as per the drawings supplied by BHEL-Trichy. The job shall be carried out under the supervision of BHEL/ customer engineers. Any minor changes/ alteration in the work at any stage for successful erection of the system have to be carried out after getting consent from BHEL/customer.

2.10 Castable Refractory Application for extended back pass panel:-

The scope covers

- Application of castable refractory above extended back pass panel inside the boiler.
- The approximate weight of refractory to be applied is 30 MT.

The installation work to be carried out as per the drawings supplied by BHEL-Trichy. The job shall be carried out under the supervision of BHEL/ customer engineers. Any minor changes/ alteration in the work at any stage for successful erection of the system have to be carried out after getting consent from BHEL/customer.

2.11 Replacement of 8 nos. Separator Safety Valve

The Scope Covers

- Arrangement/preparation of scaffolding around 8 nos. separator safety valve to be replaced.
- Insulation removal around safety valve for cutting & dismantling of the same.
- Preparation of arrangement through chain pulley block/sling for dismantling of the separator safey valves.
- Cutting (by grinding only) of existing separator safety valves from erection welding joint, cutting of safety valve drain lines, making gap between outlet flanges of Safety Valve, dismantling from its position & bringing down to nearest floor.
- Erection, fit-up, alignment, welding of newly supplied 8 nos. separator safety valves in position.
- Pre-Heat, PWHT, 100 % NDT(RT/UT) as per BHEL EWS.
- Connecting/rewelding of safety valve drain pipe, flange connection of Safety valve exhaust line, other connection as required. In case the drain point position, exhaust flange position changes, vendor has to modification in exhaust pipe line, drain line for matching ith newly erected safety valves.
- Re-Insulation of newly erected 8 nos. separator safety valves.
- Handing over of 8 nos. dismantled safety valve to customer & disposal of other scraps to a location inside plant (as instructed by BHEL).
- Assistance during hydro test & Safety Valve Setting/floating of these 8 nos. valves.
- Safety Valve Details:

i) SPRTR SV 173AWP LIFT70% SET PR. 298.7,
Size: 2.5" (Inlet Neck)
Qty: 4 Nos
Wight: 318 Kg/Valve, thus for 4 Valves Total weight: 1272
Valve Inlet Neck Material Spec:SA 182-F22

ii) SPRTR SV 174AWP LIFT90% SET PR 305.1,
Size: 3"(Inlet Neck)
Qty: 4 Nos
Wight: 420 Kg/Valve, thus for 4 Valves Total weight: 1680
Valve Inlet Neck Material spec:SA 182-F22

Note: i) Above mentioned scope are tentative.
ii) Refer attached drawing for safety valve details.

3. Tentative description of Joints to be done or associated with the erection of coils, cutting and restoration of walls and fixing of profile tubes of doors and LRSB In shut down Period (Joints related to Final SH ,Platen SH Modification & Separator Safety Valve replacement is not mentioned below, it is mentioned above in sl no 2.6 & 2.11 of this scope).

After completion of joint fit up and clearance from BHEL Engineers, welding to be started by qualified HP welders. The details of the joints are as follows involved in the erection of LTRH pendent, LTRH Horizontal, ECO outlet header, Economiser Coils & Profile tubes.

Sl. No.	Description of Joints	Nos.	Dia. X Thk.	Materials	Pre-Heat /PWHT	NDT (Rt & Paut)	Required Hardness Test
1.	BP roof Joints (After cutting of Roof)	408	44.5X8	SA213 Gr12	Pre heat-150°C PWHT-NA	Min-20%	
2.	BP Side Wall (cut for LTRH Pendent Coil Insertion considering 20 tubes cut at 03 places).	120	57.2X9.4	SA213 Gr12	Pre heat-150°C PWHT-NA	Min-20%	
3.	Joint B/W LTRH (Existing) + New Pendent U Bend	808	63.5X5	SA213 T91	Pre heat-220°C PWHT-745±15°C	100%	100% HC, 300 HV MAX
4.	Joint B/W New Pendent U Bend+ New Pendent	808	63.5X5	SA213 T91	Pre heat-220°C PWHT-745±15°C	100%	100% HC, 300 HV MAX
5.	Joint B/W New Pendent + New Elbow/loose tube	808	63.5X5	SA213 T91	Pre heat-220°C PWHT-745±15°C	100%	100% HC, 300 HV MAX
6.	Joints B/W New Pendent Elbow + New LTRH Upper Coil	808	63.5X4.57	SA213 T91	Pre heat-220°C PWHT-745±15°C	100%	100% HC, 300 HV MAX
7	BP Rear Wall (cut for LTRH horizontal Coil Insertion).	408	44.5X8	SA213 Gr12	Pre heat-150°C PWHT-NA	Min-20%	
8.	LTRH Hanger tubes	816	57.2X12.7	SA213 Gr12	Pre heat-150°C PWHT-NA	Min-20%	
9.	Joints B/W upper LTRH horizontal (Existing) + New LTRH horizontal	808	63.5X4	SA213 T91& SA213 T23	Pre heat-220°C PWHT-745±15°C	100%	100% HC, 300 HV MAX FOR T91 & 260 HB FOR T23
10.	Joints B/w ECO O/L Header and New Terminal Tubes	812	44.5X8	SA210 Gr. C	Pre heat-NA PWHT-NA	Min-20%	
11.	ECO links Joints (Both sides)	4	508 X 71.5	SA210 Gr. C	Pre heat-150°C PWHT-635±15°C	100%	

12.	Opening In the BP side wall for Header lifting	96	57.2X9.4	SA213 Gr12	Pre heat-150°C PWHT-NA	Min-20%	
13.	BP Rear Wall (cut for Eco horizontal Coil Insertion).	408	44.5X8	SA213 Gr12	Pre heat-150°C PWHT-NA	Min-20%	
14.	ECO Hanger tubes	816	57.2X12.7	SA213 Gr12	Pre heat-150°C PWHT-NA	Min-20%	
15.	Joints between New terminal tubes and New ECO Coils	812	44.5X8	SA210 Gr. C	Pre heat-NA PWHT-NA	Min-20%	
16.	Joints B/w New Eco Coils & Existing Eco Upper Coil	812	44.5X8	SA210 Gr. C	Pre heat-NA PWHT-NA	Min-20%	
17.	Approx. Joints for new LRSB (total 14 Nos.)	140	57.2X9.4	SA213 Gr12	Pre heat-150°C PWHT-NA	Min-20%	
18.	Approx. Joints for new Manhole door (total 6 Nos.)	158	57.2X9.4	SA213 Gr12	Pre heat-150°C PWHT-NA	Min-20%	
19.	Soot blowing pipe joints.	200	60.3X5.54	SA335 P22	Pre heat-150°C PWHT-NA	Min-20%	
	Total Joints.	10050					

3.1 Pre- heat of Pipe joints (of any spec) & T23 tubes to be done with resistance heating coils only.

3.2 Preheating of joints other than T-23 and pipe of any grade materials shall be done by resistance heating coils OR heating torch (using perforated burner with oxy acetylene/LPG) with temperature recorder only. Preheating by cutting torches is not permitted.The decision of BHEL engineers shall be final in this regard.

3.3 Only IBR qualified welders shall be tested as per BHEL welder qualification test procedure and qualified welders shall be allowed to be engaged with the job.

3.4 Adequate nos. of heating panels with recorders (for pre-heating/ post heat/PWHT) shall be used with valid test/ calibration certificate of the equipment (refer T&P list, as to be provided by vendor).

3.5 PWHT to be done as per BHEL approved EWS/FQP. PWHT of T-23 shall be done by using low voltage ceramic pads resistance coils only. The decision of BHEL engineers shall be final in this regard.

3.6 Radiography is to be taken as per the quantity mentioned in approved EWS. Penalty shots (on occurrence of any joint defect) to be taken as per procedure and norms of BHEL/IBR. The decision of BHEL engineers shall be final in this regard.

3.7 Qualified agency/persons are required to take radiography, RT film processing and development and interpretations of films. However, acceptance of the joints shall be as per IBR/ASME/BHEL codes and norms.

3.8 Arrangements for radiography source handling at site, dark room to develop the RT films, RT film viewer and Pit room to be made by vendor.

3.9 The quantity of NDT as mentioned above is indicative only, and it may vary as per BHEL approved EWS(to be provided during execution). Vendor has to do the job as per approved EWS only within their quoted price.

3.10 NDT other than RT system have to be taken by PAUT (Phased Array Ultrasonic Technique) system. The quantity of the NDT shall be 20% Gamma Ray RT and 80 % PAUT wherever 100% NDT is applicable OR as per EWS(will be provided during execution).

3.11 The Hardness requirement mentioned above are indicative only & it may vary as per BHEL approved EWS (to be provided during execution). Vendor has to carry out the job as per approved EWS only within their quoted price). The hardness to be taken with UCI (ultrasonic compact impedance) tester (Refer T&P list).

3.12 The Nos. of joint & size of tubes as mentioned above are indicative only. It may vary during actual execution of the job. All joints and their NDT, PWHT,Hardness irrespective of variation from indicated/ EWS quantity has to be done within quoted price only.

3.13 Vendor has to replace the joint with inserting a spool piece (if required) due to wrong cutting or misalignment of the joint free of cost. In that case no of joints and corresponding quantity of NDT may vary.

Notes:-

1. Vendor has to mobilize at site witin 7 days of intimation of BHEL to complete all preparatory works/pre-shutdown activities prior to shutdown, shifting of maximum plant materials and all arrangements for shifting of coils to nearest platforms and to make other necessary arrangements etc.

2. Agency should submit a detailed resource/manpower linked execution plan (in the form of PERT network / BAR chart) to BHEL/NTPC EIC immediately after receipt of LOI and same has to be finalized after reviewing from BHEL/NTPC and to be mutually agreed within 07 days. In respect of time schedule, it may be noted that 65 days of shutdown period will be allocated for this job along with 10 days of grace period as per discretion of BHEL/NTPC.

3. The Agency should make up for any inadequacy in mobilization as felt by BHEL/ NTPC within 24 hours of intimation. In case Agency fails to mobilize sufficiently and the progress of work at various stages is not achieved, BHEL/ NTPC will mobilize at the risk and cost of the contactor. In such case, BHEL/NTPC overhead will be charged along with the cost of mobilization.

4. Any scaffolding required for the retrofitting job to make an easy approach for inspection by BHEL/NTPC authority has to be carried out by the Agency without any extra cost. All scaffolding materials (steel pipes, clamps, steel planks etc.) for the same to be arranged by vendor.

5. Vendor has to supply & apply touch up/finish paints in newly erected structures, platforms, restored platforms/structures/buckstays etc. & also in existing areas wherever painting will be removed during dismantling, re-erection work etc.

6. The fixtures/T&P's required for load transfer arrangement/ lifting arrangements of coils,headers etc shall be arranged by the contractor at his own cost. However, Steel structures (I-beam, channel, angle etc.) for load transfer arrangemt of RH Coil erection, ECO Coil erection, other jobs for the retrofit work etc. shall be provided by BHEL (free of cost). However, no payment shall be made to vendor for Erection & Removal of load transfer arrangement/temporary steel structures & vendor has to do the same within its quoted price without any extra cost (Approximate weight of load transfer arrangement/Temporary Support will be around 35 MT). Tentative load transfer arrangement sketch is attached with tender document. Vendor will have to return the Steel structures in as received condition.

7. The scope under this specification is not exhaustive but indicative only. However, any activity covered under the normal course of rectification job shall be deemed to be within the scope. The scope shall also include manpower assistance during Hydro test / vacuum pulling of the circuits and subsequent activities till synchronization of the unit. After successful completion of hydro test/ vacuum pulling of the unit, application of refractory & insulation followed by skin casing plate welding (attached to pressure parts only) to be done within next time as per schedule allocated for the job. Re heater hydro test may require blanking & de-blanking of HRH & CRH Isolatator.

8. Time is the essence of this contract, Hence contractor must mobilize to site with adequate manpower and corresponding resources for round the clock 12 hours shifts work during the entire duration of job. Also adequate T&P, consumables and inspection/measuring and monitoring devices are to be mobilized at site for two/three shift operations to avoid any hold up during execution of the work.

9. Vendor is also advised to visit 2X660MW NTPC Barh project, for clear and better understanding of the job before quoting the tender. It is also advised to vendor, after mobilization at site and before start of the actual erection work after unit shut down, a demonstration of coil lifting to be done (and assure load testing with TPI certification) to avoid any obstacle/unforeseen hindrances during actual execution of the job.

10. Post synchronization of the unit, observation for 72 hrs. at stable rated load and attending all works to rectify defects if any pertaining to concerned area, is included within the scope of work. Prior to mobilization of site, list of work men shift wise with the concerned work area supervisor shall be finalized jointly with BHEL/Customer.

11. Returning/ Reconciliation of issued materials, transportation/disposal of old / dismantled/ surplus material at appropriate place inside plant premises to be done by vendor during execution/on completion of job.

12. Vendor should provide test certificate for all the T&P's mobilized at site. The erection arrangement (for coils, structures, pr Parts etc) to be made by vendor, has to be tested at site through testing agency.

Terms of Payments:

(A) Break up of 90% Payment:- 90% of the payment shall be made after completion of the job with respect to BOQ (SCH-2 of price Schedule). Payment shall be made after completion of work for items against Sl. no-. 1 to 12. The payment shall made on pro rata basis and payment break up shall be as follows:-

Sl. No.	Description of work	Payment Break up						
		Sl. No. 1, 3, 6 of BOQ (SCH-2 of Price Schedule)	Sl. No. 8.1, 9.1 of BOQ (SCH-2 of Price Schedule)	Sl. No. 4, 5.1, 9.2, 10.1, 11.1 of BOQ (SCH-2 of Price Schedule)	Sl. No. 2, 7, 8.2, 9.3 of BOQ (SCH-2 of Price Schedule)	Sl. No. 5.2 of BOQ (SCH-2 of Price Schedule)	Sl. No. 12 of BOQ (SCH-2 of Price Schedule)	Sl. No. 13 of BOQ (SCH-2 of Price Schedule)
1.	Completion of cutting of existing parts/items	75%	60%	-------	------	------	20%	---
2.	Completion of erection/Restoration (with applicable pre-assembly).	----	30%	40%	38%	38%	30%	--
3	Alignment & welding (Including Fins welding as applicable)	---	-------	25%	25%	25%	20%	---
4	Completion of non-destructive examination & stress relieving / heat treatment (As Applicable)	-----	-------	20%	20%	20%	15%	----

Sl. No.	Description of work	Payment Break up						
		Sl. No. 1, 3, 6 of BOQ (SCH-2 of Price Schedule)	Sl. No. 8.1, 9.1 of BOQ (SCH-2 of Price Schedule)	Sl. No. 4, 5.1, 9.2, 10.1, 11.1 of BOQ (SCH-2 of Price Schedule)	Sl. No. 2, 7, 8.2, 9.3 of BOQ (SCH-2 of Price Schedule)	Sl. No. 5.2 of BOQ (SCH-2 of Price Schedule)	Sl. No. 12 of BOQ (SCH-2 of Price Schedule)	Sl. No. 13 of BOQ (SCH-2 of Price Schedule)
5	Completion of Hydro test	15%	------	5%	5%	5%	5%	---
6	Supply & Application of Touch up/finish painting for Newly Erected Structure, Restored Structure, Buckstay, Floor Members etc	------	-------	-------	2%	------	----	----
7	Cable laying, cable termination,ferulling, dressing, panel erection,Testing, Commissioning & All Electrical & C&I work related to 12 No Newly Erected LRSB & 4 No Relocated LRSB	-------	-----	------	-----	2%	-----	-----
8	Arrangement and erection of cup lock scaffolding in fast pass upto bottom of PSH for PSH modification work							80%
9	Dismantling of cup lock scaffolding in fast pass upto bottom of PSH for PSH modification work							10%
	Total	90%	90%	90%	90%	90%	90%	90%

(B). Break up of Balance 10% Payment:-

Sl. No	Particulars	% allocation
1	Completion of initial commercial run of boiler for 72 Hrs after retrofitting.	5%
2	Submission of as-built drawings.	1%
3	Liquidation of pending points	1%
4	Reconciliation of issued materials, disposal of old / dismantled/ surplus material at appropriate place (as indicated by BHEL/NTPC)	2%
5	Completion of all contractual Obligation and de-mobilization of site office.	1%
6	Total	10%

i. Successful bidder shall submit RA bill once in a month at the end of each month as per billing break-up of the tender. The measurement will be taken by BHEL engineer as per relevant clause of GSCC and certify regarding the actual work executed in the measurement book and bills for work.

ii. Progressive payment shall be made by BHEL against successful bidder's RA bill, complete & correct in all respects accompanied by BHEL engineer's certified/ measurement sheet, jointly signed; requisite statutory certificates, certified by BHEL; within 60 days of submission of the bill. The bill shall also accompany monthly progress report.
iii. However no extra payment shall be made in the event of deferment in payment.
iv. For all items of work as per the break-up, interim payment shall be limited to 95% of the gross value of interim bill. Balance 5 % shall be released on completion of guarantee period. However, this 5%, retained from each RA bill, may be released against submission of a separate bank guarantee as per Performance Bank Guarantee format, to be kept valid till guarantee period, subject to (i) Receipt of certificate that all works are completed in all respects; (ii) Reconciliation of materials/ T&P/ MMD; (iii) Completion of final bill formalities and (iv) Handing over to BHEL/ customer.
v. Out of above 95%, 2.5% of gross bill amount shall be paid in the following manner on certification by BHEL engineer after compliance of each of following activity in each month. In case of non-fulfillment of respective activity by successful bidder in each month, no payment shall be made by BHEL against corresponding activity and no claim of successful bidder, at a later date, whatsoever, in this regard will be entertained by BHEL.

v.a 0.5% shall be paid on compliance of house-keeping of successful bidder's working area and store/ office areas.
v.b 0.5% shall be paid on compliance of general illumination of successful bidder's working area and stores, office area.
v.c 0.5% shall be paid on compliance of applicable OHSAS requirement as per guidelines of BHEL and as specified in the tender.
v.d 0.75% shall be paid on compliance of applicable safety requirement as per guidelines of BHEL and as specified in the tender.
v.e 0.25% shall be paid on compliance of applicable security requirement as per guidelines of BHEL.

vi. Each RA bill shall accompany with latest agreed & jointly signed L-3/ construction schedule, as enumerated in this tender.
vii. All admissible recovery/ adjustment, etc. shall be made from interim payable amount.
viii. Further billing break up for release of progressive payment shall be made jointly at site.
ix. Paying Authority: Construction Manager, BHEL-Barh site.

GUARANTEE / WARRANTY, LATENT DEFECT LIABILITY:

a) Even though the work will be carried out under supervision of BHEL, the successful bidder will be responsible for the quality of workmanship, quality of materials/ items and design for which the successful bidder is responsible.
b) The successful bidder shall guarantee the work executed under the scope of the contract for a period of 12 (Twelve) months from the date of start of guarantee period as certified by the engineer (i.e. on completion of total work under scope of work and/ or handing over to BHEL/ owner) and shall rectify free of cost all defects due to faulty supply or work done. In case the successful bidder fails to repair/ replace the defective works within the time specified by the engineer, BHEL may proceed to undertake the repairs/ replace such defective works at successful bidder's risk & cost without prejudice to any other rights and recover the same from security deposit/ other dues.
c) Other provision shall be as per the GSCC.

LIQUIDATED DAMAGE:

In the event of failure to complete the work in given time(Shutdown Period:65 days+10days grace period), penalty @ 0.5% of contract value per day limited to 10% of contract value for the delay(Extension of Shutdown) attributable to vendor will be levied, in case the balance work is allowed to be completed by the contractor beyond the scheduled time of completion, which is at the discretion of BHEL. In case of delays on contractor's part, at any stage during the scheduled period or after, BHEL shall have the option of ensuring completion of the job by any other means at its disposal and the charges on this account shall be levied on the contractor. These shall be adjusted against contractor's bills or Security Deposit.

"In case of LD recovery, the applicable GST shall also be recovered from Contractor".

EXTRA WORK RATES CURRENTLY BEING ADMITTED BY BHEL, PS-ER [Page-10, SPECIFIC TERMS AND CONDITIONS FOR SERVICES JOBS] shall be read as below: -

EXTRA WORK RATES CURRENTLY BEING ADMITTED BY BHEL, PS-ER

MAN-HOUR RATE FOR ELIGIBLE EXTRA WORKS: Single composite average labour man-hour rate, including overtime if any, supervision, use of tools and tackles and other site expenses and incidentals, consumables for carrying out any major rework/ repairs/ rectification/ modification/ fabrication as certified by site as may arise during the course of erection, testing, commissioning or extra works arising out of transit, storage and erection damages, payment, if found due will be at Rs 108/- per man hour.

INPUTS REQUIRED FROM SUCCESSFUL BIDDER

1. Statutory clearances, payment of minimum wages as revised from time to time, all clearances from CIB Bihar i.e. approval of drawings, clearance for execution of work, re-BLU etc. as required has to be taken care by the Agency/Contractor. Necessary inspection fees of Bihar Boiler Directorate only will be paid by BHEL / OWNER in this regard on reimbursement basis on production of fee receipt. All other incidental expenditures need to be borne/absorbed by the vendor within their quoted price.

2. Contractor has to arrange for necessary labour license, insurance etc. for their workmen and other necessary statutory requirements are to be fulfilled. Co-ordination with Boiler Inspector is the responsibility of the contractor.

3. For Boiler Pressure parts job, contractor has to take necessary approval under Section 392 of IBR from the Boiler Directorate.

4. Agency should submit the valid IBR performance qualification certificate of welders and endorsed by Directorate of Boilers, Bihar whom he intends to deploy in the job

5. Contractor has to provide necessary skilled, semiskilled and unskilled manpower and supervision for the total job under the technical guidance of BHEL. Contractor has to provide following manpower/ resources (indicative only) to execute the job on round the clock basis and complete the job in time:

(i) Around 50-60 HP WELDERS in peak time and corresponding welding and heating resources.
(ii) Around 15-20 ATTACHMENT WELDERS in peak time.
(iii) Around 40 Nos. of grinders.
(iv) Around 40-45 fitters in peak time.
(v) Around 15-18 rigging gangs.

However, vendor has to submit the manpower deployment plan in line with their own schedule as indicated in Notes (sl. no.2.) of annexure-I.

In respect of grinders indicated above, vendor may propose / mobilize automatic cutter and beveling machine for specified OD tubes. Accordingly grinders indicated may be reduced. However job within the tender scope has to be completed in totality within the quoted rates and terms.

Contractor has to mobilize H. P. Welders well in advance for their welder qualification test as per IBR/BHEL/Customer norms and for site simulation. Contractor has to provide sufficient experienced supervisory staff (exclusively for all work fronts) in respective areas in retrofitting ofboilers excluding site in-charge for close supervision of work as well as providing inputs for uninterrupted progress of the job.

6. Cleaning, housekeeping and security arrangement for the equipment, T&P and materials, spares are the responsibility of the contractor.

7. The contractor has to sign "INDEMNITY BOND" for obtaining Form –V (required for labour license) from the Principal Employer M/s NTPC/BARH on non-judicial stamp paper as per format provided by BHEL.

General scope of work and terms:

01. The contractor shall take delivery of material/equipment at projects store/yard. As soon as the material is issued to the contractor, all responsibility of proper handling and storage shall be the responsibility of the contractor and thereafter any loss/damage to the equipment and material due to faulty handling and storage or any other reason attributable to contractor, shall be made good by the contractor at his own cost and return to store all left out materials & material reconciliation to be done.
02. The contractor shall check, tally and inspect all materials consignments issued to him and shall maintain proper records or the receipt of materials received and such reports shall be produced by the contractor to the Engineer for verification. Any deviation from packing list or damage to any component noticed during receipt of material should be immediately brought to the notice of BHEL engineer. Any claim in this regard after receipt of materials by the contractor will not be entertained.
03. Construction Power: BHEL shall provide construction power free of charges at one point as per availability from customer. Vendor has to make his own arrangement for further distribution from the single point provided.
04. Any illumination for carrying out the job as may be required is to be arranged by vendor.
05. Disposal of scrap/ waste/ insulation generated during the work to be disposed-off by the vendor including transportation of the waste at predetermined place as indicated by BHEL/customer.
06. Machining activities if required due to mismatch in ID or any other reason is in vendor's scope.
07. Preparation of site store near working area.
08. Minor modification in the job at any stage if required to be done at free of cost by the vendor.
09. The bidder will have to install 2 nos. PC (multimedia PC work station Pentium-Core-i5, 1 GHZ or above, 320 GB HDD, 2GB RAM, 100 MBPS LAN card of HCL/ COMPAQ/ ZENITH/ LENOVO or equivalent make with window 7 O/S and required software like MS Office 2010 Professional, AutoCAD 2010, PageMaker (7.0 etc), ADOBE PDF CREATOR with) one no laser jet printer compatible for A4 size printing (ink/ cartridge for which to be supplied as and when required) with power backup at places, as per instruction of BHEL for exclusive use of BHEL. These computers / printers shall remain contractor's property and they will be allowed to take out the same after completion of the works.
    The contractor shall provide data / information etc. in prescribed formats for periodical updating of the progress reports, material management reports, updating of network pertaining to the contractor's scope of work etc. The contractor shall also provide 02 nos. computer operators (over and above his own requirement for operation & maintenance of SOMS system at site) and two numbers service staff for miscellaneous service for BHEL's use at site for reconciliation, site support, progress review & day-to-day planning purpose, documentations etc. These facilities are to be provided as per instruction of construction manager till completion of contract period & demobilisation of the contractor. In case vendor fails to provide the PC operator & service staff following shall be ducted from Vendors RA Bill
    i) @ Rs 15,000/- (Fifteen thousand) per month for computer operator or at actual rate +05%, whichever is lower per month per person.
    ii) @ Rs 12,000/- (Twelve thousand) per month for service staff or at actual rate +05%, whichever is lower.

ELECTRICITY

i. BHEL shall provide construction power on free of cost basis at 415 V at one point. Contractor has to make their own distribution arrangement to draw electricity by arranging all required items e.g power cable, construction cable, ELCB,MCCB, JB's, Switch Borads etc to be arranged by vendor at his own cost.

ii. The bidder shall have to provide earth leakage circuit breaker at each point wherever human operated electrical drives/ T&Ps are deployed.

iii. The power supply will be from the available grid. BHEL shall not be responsible for any inconvenience or delay caused due to any interruption of power supply/ variation in voltage level and no compensation for delay in work can be claimed by the contractor due to such non-supply on the grounds of idle labour, machinery or any other grounds.

iv. Bidder will have to arrange sufficient illumination at their own work areas.

v. The contractor should ensure that the work in critical areas is not held up in the event of power breakdown. In the event of breakdown in the electric supply, if the progress of work is hampered, it will be the responsibility of the contractor to step up the progress of work after restoration of electric supply so that overall progress of work is not affected.

HEALTH, SAFETY & ENVIRONMENT

As per BHEL HSE Plan doc no. HSEP:14-ER,Rev.01 dtd. 08/05/20, HSE OCP:61, Rev 01, dtd. 01/06/20 & HSEOCP:61A, dtd.27/04/20.

TAXES & DUTIES –GST REGIME

1.0 TAXES & DUTIES, ETC.

1.1 All taxes excluding GST with applicable cess & BOCW Cess (mentioned elsewhere in the Tender) but including, Charges, Royalties, any State or Central Levy and other Taxes for materials if any obtained for the work and for the execution of the contract shall be borne by the bidder and shall not be payable extra by BHEL.

1.2 Any increase in the above at any stage during execution including extension of the contract, if any, shall have to be borne by the contractor. Quoted/ accepted rates/ price shall be inclusive of all such requirements.

1.3 GST with applicable Cess, legally leviable & payable by the successful bidder as per GST Law, shall be paid extra by BHEL. Hence, Bidder shall not include GST with applicable Cess in their quoted price.

1.4 The successful bidder shall furnish proof of GST registration with GSTN Portal covering the services under this contract. Registration should also bear endorsement for the premises from where the billing shall be done by the successful bidder on BHEL for this project/ work.

1.5 Since GST on output will be paid by BHEL separately as enumerated above, bidder's quoted rates/ price should be after considering the Input Credit under GST law at their end.

1.6 TDS under Income Tax shall be deducted at prevailing rates on gross invoice value from the running bills unless exemption certificate from the appropriate authority/ authorities is furnished.

1.7 TDS under GST shall be deducted at applicable rates on gross invoice value from the running bills.

1.8 Bidder shall note that the GST Tax Invoice complying with GST Invoice Rules (Section 31 of GST Act & Rules referred there under) wherein the 'Bill To' details shall be as per following.

BHEL GSTN: 10AAACB4146P1ZU
NAME: Bharat Heavy Electricals Limited
ADDRESS: BHEL- Site Office
NTPC-BARH STPP
PO: BARH, PATNA
BIHAR-803 215, India

1.9 Bidder to intimate immediately on the day of removal of Goods (in case of any supply of goods) to BHEL along with all relevant details and a scanned copy of Tax Invoice through following communication mode for enabling BHEL to meet its GST related compliances

Portal Address – Shall be intimated later.

And

Email Address – Shall be intimated later.

In case of delay in submission of the above mentioned documents on the date of dispatch, BHEL may incur penalty /interest for not adhering to Invoicing Rules under GST Law. The same will be liable to be recovered from the successful bidder, if such delay is attributable to the bidder.

1.10 In case of raising any Supplementary Tax Invoice (Debit / Credit Note) Bidder shall issue the same containing all the details as referred to in Section 34 read with Section 31 of GST Act & Rules referred there under.

1.11 Bidder shall Comply with the Time limit prescribed under the GST Law and rules thereof for raising of the tax invoice. If any supply of goods is applicable, Bidder shall also ensure prompt delivery of Goods after dispatch.

1.12 Bidder shall note that in case GST credit is delayed/ denied to BHEL due to delayed / non receipt of goods and /or tax invoice or expiry of the timeline prescribed in GST Law for availing such ITC, or any other reasons attributable to the bidder, GST amount shall be recoverable from the bidder along with interest levied / leviable on BHEL, as the case may be.

1.13 Bidder shall upload the Invoices raised on BHEL in GSTR-1 within the prescribed time as given in the GST Act. Bidder shall note that in case of delay in declaring such invoice in your return and GST credit availed by BHEL is denied or reversed subsequently as per GST Law , GST amount paid by BHEL towards such ITC reversal as per GST law shall be recoverable from the bidder along with interest levied / leviable on BHEL.

1.14 Way Bill: Successful Bidder shall arrange way bill / e-waybill for any transfer of goods for the execution of the contract.

The Bidder has to make their own arrangement at their cost for completing the formalities, if required, with Issuing Authorities, for bringing materials, plants & machinery at site for execution of the works under this contract, Road Permit/ Way Bill, if required, shall be arranged by the contractor and BHEL will not supply any Road Permit/ Way Bill for this purpose.

1.15 Any new taxes & duties, if imposed subsequent to the due date of offer submission as per NIT & TCN, by statutory authority during contract period (including extensions for which delay is not attributable to the bidder), shall be reimbursed by BHEL on production of relevant supporting document to the satisfaction of BHEL. However, bidder shall obtain prior approval from BHEL before depositing any such new taxes and duties.

Benefits and/or abolition of all existing taxes must be passed on to BHEL against new taxes, if any, introduced at a later date.

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Annexure –BOCW

Specific clause wrt BOCW Act & Cess Act

1. It shall be the sole responsibility of the contractor as employer to ensure compliance of all the statutory obligations under the Building and other Construction Workers' (Regulation of Employment and Conditions of Service) Act, 1996 and the Building and other Construction Workers' Welfare Cess Act, 1996 and the rules made thereunder.
2. It shall be sole responsibility of the contractor engaging Building Workers in connection with the building or other construction works in the capacity of employer to apply and obtain registration certificate specifying the scope of work under the relevant provisions of the Building and Other Construction Workers' (Regulation of Employment and Conditions of Service) Act, 1996 from the appropriate Authorities.
3. It shall be responsibility of the contractor to furnish a copy of such Registration Certificate within a period of one month from the date of commencement of Work.
4. It is responsibility of the contractor to register under the Building and other Construction Workers' Welfare Cess Act, 1996 and deposit the required Cess for the purposes of the Building and other Construction Workers' (Regulation of Employment and Conditions of Service) Act, 1996 at such rate as the Central Government may , by notification in the Official Gazette, from time to time specify. However, before registering and deposit of Cess under the Building and other Construction Workers' Welfare Cess Act, 1996, the contractor will seek written prior approval from the Construction Manager.
5. In case where the contractor has been accorded written approval by the Construction Manager and the contractor is required to furnish information in Form I and deposit the Cess under the Building and other Construction Workers' Welfare Cess Act, 1996, fails to do so, BHEL reserves right to impose penalty at the rate of 30% of Cess Amount.
6. It shall be sole responsibility of the contractor as employer to get registered every Building Worker, who is between the age of 18 to 60 years of age and who has been engaged in any building or other construction work for not less than ninety days during the preceding twelve months as Beneficiary under the Building and other Construction Workers' (Regulation of Employment and Conditions of Service) Act, 1996.
7. It shall be sole responsibility of the contractor as employer to maintain all the registers, records, notices and submit returns under the Building and other Construction Workers' (Regulation of Employment and Conditions of Service) Act, 1996 and the Building and other Construction Workers' Welfare Cess Act, 1996 and the rules made thereunder.
8. It shall be sole responsibility of the contractor as employer to provide notice of poisoning or occupation notifiable diseases, to report of accident and dangerous occurrences to the concerned authorities under the Building and other Construction Workers' (Regulation of Employment and Conditions of Service) Act, 1996 and the rules made thereunder and to make payment of all statutory payments & compensation under the Employees' Compensation Act, 1923.

Annexure –BOCW

Specific clause wrt BOCW Act & Cess Act

9. It shall be responsibility of the Contractor to furnish BHEL on monthly basis, Receipts/ Challans towards Deposit of the Cess under the Building and other Construction Workers' Welfare Cess Act, 1996 and the rules made thereunder along with following statistics :

   (i) Number of Building Workers employed during preceding one month.
   (ii) Number of Building workers registered as Beneficiary during preceding one month.
   (iii) Disbursement of Wages made to the Building Workers for preceding wage month.
   (iv) Remittance of Contribution of Beneficiaries made during the preceding month

10. BHEL shall reimburse the contractor the Cess amount deposited for the purposes of the Building and other Construction Workers' (Regulation of Employment and Conditions of Service) Act, 1996 under the Building and other Construction Workers' Welfare Cess Act, 1996 and the rules made thereunder. However, BHEL shall not reimburse the Fee paid towards the registration of establishment, fees paid towards registration of Beneficiaries and Contribution of Beneficiaries remitted.

11. It shall be responsibility of the Building Worker engaged by the Contractor and registered as a beneficiary under the Building and other Construction Workers' (Regulation of Employment and Conditions of Service) Act, 1996 to contribute to the Fund at such rate per mensem as may be specified by the State government by notification in the Official Gazette. Where such beneficiary authorizes the contractor being his employer to deduct his contribution from his monthly wages and to remit the same, the contractor shall remit such contribution to the Building and other construction Workers' Welfare Board in such manner as may be directed by the Board , within the fifteen days from such deduction.

12. If any point of time during the contract period, non-compliance of the provisions of the Building and other Construction Workers' (Regulation of Employment and Conditions of Service) Act, 1996 and the Building and other Construction Workers' Welfare Cess Act, 1996 and the rules made thereunder is observed, BHEL reserves the right to withhold a reasonable amount from the payables to discharge any obligations on behalf of Contractors. The reasonable amount shall be decided by the Construction Manager in consultation with Resident Accounts Officer & Head HR and shall be final.

13. The contractor shall declare to undertake any liability or claim arising out of employment of building workers and shall indemnify BHEL from all consequences / liabilities / penalties in case of non compliance of the provisions of the Building and other Construction Workers' (Regulation of Employment and Conditions of Service) Act, 1996 and the Building and other Construction Workers' Welfare Cess Act, 1996 and the rules made thereunder.

Annexure-II

The list of T & P are provided hereunder to be mobilized by the contractor as per mobilization time mentioned in Annexure-I. These will be physically verified by BHEL site Engineer. BHEL has the authority to penalize the contractor suitably including termination of contract if the required T&P's are not mobilized timely. However, it may be noted that the T&P list is only a guide for bidding and any other T&P as may be required for the job has to be mobilized by the successful bidder.

List of the T&Ps and MMDs to be provided by the contractor:

Sl. No.	DESCRIPTION OF T&Ps / EQUIPMENTS	Capacity /Specification	Tentative Quantity required.
1.	Tyre mounted telescopic boom crane	40MT or higher capacity	01 No(as required)
2.	Tyre mounted mobile crane(12/14 T)-2 at yard, 4 at site(minimum)	12-14 MT	04 No(02 at yard and 02 at site) / Adequate qty as required
3.	Trailer (40 ft)- 25 T	40 Ft- bed OR 25 MT Capacity	02 No/Adequate qty as required
4.1	Winch M/c	5MT/10MT Capacity	14 to 16 Nos/ Adequate qty as required
4.2	Winch M/c	3 MT/2 MT/1 MT	Adequate nos. as required
5.	Chain pulley blocks.	10 MT with 8 meter lift	Adequate nos. as required
6.	Chain pulley blocks	5 MT with 8 meter lift	Adequate nos. as required
7.	Chain pulley block	2 MT with 8mtr lift	Adequate nos. as required
8.	Chain pulley block	1 MT with 8mtr lift	Adequate nos. as required
9.	Hook chuck	2 MT	Adequate nos. as required
10.	Slings	2 MT / 5 MT / 10 MT	Adequate nos. as required
11.	D-shackles	------	Adequate nos. as required
12.	Ratchet hoist	5-10 T	Adequate nos. as required
13.	Manila rope	25 mm	Adequate nos. as required
14.	Air Compressor	7-9Kg/Sq. Cm	1 no (as required)
15.	Welding Generator machines		70 Nos/Adequate qty. as required
16.	Argon set		As per requirement.
17.	Heating torch (Perforated burner) along with regulator & hoses		Adequate nos.
18.	Pre-heating/ stress relieving set (heating control panel, cables, heating elements etc.).		Adequate nos.
18.1	Calibrated PID controlled heating panel		20 TO 25 Sets Minimum/ Adequate qty. as required
18.2	calibrated 6 point Temperature recorders		40 nos. Minimum/ Adequate qty. as required
18.3	reading cable		30 bundles (3000 m) minimum/ Adequate qty. as required
18.4	K type Thermocouple wires (22 gauge)		20 Bundles minimum/ Adequate qty. as required
19.	Low Voltage heating panel with Ceramic pad for preheat and PWHT of T23 weld joints		4 sets minimum/ Adequate qty. as required.
20.	Master Baking oven		5 Nos. (For different Electrodes)/ Adequate qty. as required.
21.	Carriage/portable oven		90 nos., AC Type/ Adequate qty. as required

22.	Minimum 10 curie radiography source along with qualified personnel	Iridium-192	02 sources required.
23.	Radiography Film Viewer		02 Nos.
24.	Ultrasonic Testing M/c (Conventional as well as PAUT)		PAUT Machines (For Peak period - 5 Nos. With 10 Operators for round the clock working)
25.	Digital Temperature indicator/Contactless infrared thermometer (Thermo Gun) which can measure up to 900 degree centigrade		10 Nos Minimum/ Adequate qty. as required
26.	Portable Hardness tester (ultrasonic compact impedance type, GE make, Model MIC 10).	UCI M/c	02 Nos. Minimum/ Adequate qty. as required
27.	Portable alloy analyzer.		01
28.	Vernier Caliper 150 mm and 300 mm		Adequate qty. as required
29.	Steel Scale 150 mm, 300 mm, 1000 mm		Adequate qty. as required
30.	Taper gauge 0.1 – 10 mm		Adequate qty. as required
31.	3 phase distribution board with complete set up for drawl of construction power.	600 amp	Adequate qty. as required
32.	Electric cable for drawl & distribution of construction power.		Adequate qty. as required
33.	250 V Megger		Adequate qty. as required
34.	3 1/2 Digit digital multimeter		Adequate qty. as required
35.	24 Volt Electrical Hand lamp		Adequate qty. as required
36.	Switch board with cord		Adequate qty. as required
37.	Bevel Protractor		Adequate qty. as required
38.	Straight grinder GQ 4		Adequate qty. as required
39.	Angle grinder AG 7 and AG 5		Adequate qty. as required
40.	Pistol grinder		Adequate qty. as required
41.	Flexible grinder with necessary accessories		Adequate qty. as required
42.	Automatic Tube cutting/chamfering/beveling machine		Adequate qty. as required
43.	Pipe bending machine up to 60NB (Electro-hydraulic operated)		01 no.
44.	Pneumatic / Electric drive power hackshaw for pipe cutting		01 no./ Adequate qty. as required
45.	High pressure air hose/ Steam hose		02 nos./ Adequate qty. as required
46.	All scaffolding materials (Steel pipe, clamps, steel planks etc)		Adequate qty. as required.
47.	Gas cutting sets with flash back arrestors.		Adequate qty. as required
48.	All types of Ring , D.E. Spanners, adjustable spanner		Adequate qty. as required
49.	Center punch		Adequate qty. as required
50.	Letter punch – 4 mm size		Adequate qty. as required
51.	Number punch – 6 mm size		Adequate qty. as required
52.	Hammer – various categories		Adequate qty. as required
53.	Digital Paint Thickness measurement instrument		As required.
54	Lighting/ Extension Boards with ELCB, indutrial plugs 5 point (Upto 15 Amp)		
55	Phase Sequence Indicator	As per requirement	As Required
56	Tong tester (Up-to 400A Range)	As per requirement	As Required
57	Leakage Tester (DC/AC) - mA Range	As per requirement	As Required

58	Voltmeter (mV – 750V Range)	As per requirement	As Required
59	Insulation Resistance Tester (Megger)	As per requirement	As Required
60	mV/mA Calibrator	As per requirement	As Required
61	Digital Multi-meters	As per requirement	As Required
62	LT cable termination kit	As per requirement	As Required
63	2.5 & below lugs.	As per requirement	As Required
64	Other MMD's		
	straight edge, master level, square level, inside & outside micrometer, taper gauge, filler gauge, dial gauge,tape, etc	As per requirement	As per requirement

NOTE :-

a) EOT crane (ECO handling Hoist) shall be provided to vendor on free of cost basis in the vicinity of coil handling platform (in rear side of the boiler) based on the availability of the EOT crane. The necessary maintenance of the crane during operation shall be done by vendor on free of cost basis. Arrangement of crane operator is under vendor's scope. However, vendor has to plan their own arrangements of winches for the lifting/shifting etc. of coils.

b) The above list is not exhaustive and all T&Ps required to complete the work shall have to be arranged by the vendor at his cost.

Annexure-III

MAJOR CONSUMABLES TO BE ARRANGED/SUPPLIED BY THE CONTRACTOR

SL. NO.	*DESCRIPTION OF ITEMS*
01	*Filler wire/TIG wire, Electrodes for welding of CS , AS, SS – As required except for the special electrodes supplied by BHEL/Manufacturing Units*
02	Different gases like O2, CO2, Nitrogen, Argon, D/A etc.
03	CTC, Petrol, diesel, kerosene – As required.
04	NDE Consumables (Including DPT kit)
05	Hoses and clamps of different sizes – As required.
06.	Red Oxide,Touch –up/finish paints, preservatives and other consumables.
07	Cotton wastes, jutes etc.
08	Primer and Finish Paint (To be sourced from BHEL approved Vendor)
09	Sleepers/steel plates for movement of BHEL provided cranes for boiler work – As required.
10	Other consumables to complete the job (other than those quantities supplied by BHEL free of cost)
11	Balck Bituminus paints for application on surfaces wherever insulation/refractory to be applied

NOTE: The above list is not exhaustive and all consumables required to complete the work shall have to be arranged by the successful contractor at his cost.

MAJOR CONSUMABLES TO BE PROVIDED BY BHEL FREE OF COST

SL NO	DESCRIPTION OF ITEMS / CONSUMABLES
01	All lubricants, chemicals as required for testing, oil flushing and the lubricants for trial runs of the LRSB.
02.	TIG wires which will be supplied by BHEL units.
03	Filler rods and electrodes for T-91 & T23 joints.
04	Any other special consumables as supplied by BHEL manufacturing units

PRICE SCHEDULE (UNPRICED)

PLEASE REFER

E-PROCUREMENT PORTAL https://eprocurebhel.co.in

PRICE SCHEDULE

PLEASE REFER

E-PROCUREMENT PORTAL https://eprocurebhel.co.in

ABOVE TO BE READ ALONG WITH SCHEDULE-2 (WEIGHTAGE/PERCENTAGE ALLOCATION) OF PRICE SCHEDULE (VOLUME-III)

VOLUME-III, PRICE SCHEDULE, REV-00

JOB: "ERECTION, TESTING & COMMISSIONING OF LTRH PENDENT COILS BANK, LTRH HORIZONTAL COILS BANK, ECONOMISER HORIZONTAL COILS BANK, LIFTING OF ECONOMISER OUTLET HEADER, REPLACEMENT OF 8 NOS. SEPARATOR SAFETY VALVE, SHORTENING OF LENGTH OF FSH REAR COIL ASSY., REMOVAL OF 3 PLATEN ASSEMBLIES (9TH, 17TH & 25TH FROM BOILER LEFT SIDE TO BE REMOVED) FROM PSH ASSY. & 144 HEADER END PLUGS/BLANKED ARE TO BE INSTALLED, WELDED AT THE END OF HEADER NIPPLES OF PSH ALONG WITH CUP LOCK SCAFFOLDING ARRANGEMENT AND ERECTION & DISMANTLING UPTO BOTTOM OF PSH, ALONG WITH CONNECTED ACCESSORIES AND HYDRAULIC TEST OF THESE NEW COILS ALONG WITH OTHER RELATED CIRCUITS OF BOILER, AH SOOT BLOWER PIPING & SUPPORTS, EXTENDED BACK PASS BOTTOM SUPPORTS, ECONOMISER ANTI VIBRATION BAFFLES & CASTABLE REFRACTORY FOR EXTENDED BACK PASS PANEL AT 2X660 MW NTPC BARH STAGE-II, U#5, BARH, PATNA, BIHAR".

E-TENDER NO.: PSER:PUR:BRH-S434:20 (ENQ:20:PP:0015:PUR:88) Date 05/03/2021.

PREAMBLE

SL. NO.	DESCRIPTION
1.0	This preamble forms part of tender document and schedule of items. The tenderer should read this preamble carefully before filling in rates for various items. Clauses under this preamble shall be read in conjunction with various volumes of tender and other tender sections as applicable and shall have precedence over any contrary statement mentioned
2.0	The work shall be carried out strictly as per specifications, description of the items in these schedule and / or engineer's instructions. Drawings enclosed with the tender are only preliminary and for tender purposes and giving some idea of the work involved. The work is to be executed as per drawings & documents, which shall be furnished
3.0	Items of work provided in this schedule but not covered in this specification shall be executed strictly as per instruction of the engineer.
4.0	The quantities of the various items mentioned in this schedule of items are approximate, based on very preliminary information and may vary to any extent or be deleted altogether. The quoted rates of each item will remain firm throughout the period of execution including extension, for reasons whatsoever, as long as variation in the total value of work executed under any part of this contract including extra items, if any but excluding any price variation remains, within plus minus fifteen percent (± 15%) of the awarded price as per LOI.
5.0	Prior written approval of BHEL shall be sought by the contractor in case quantity variation of any item crosses +50% (plus fifty percent) limit during execution and approval to be obtained before execution of further quantity for this item.
6.0	BHEL reserve the right to rationalize the rates, quoted by L-1 bidder against unit rate items and/ or other optional items with respect to item-wise lowest rates (amongst the participating bidders), before placement of order.
7.0	Rates shall be quoted in figures and in words in clear legible writing. No overwriting is allowed. All scoring and cancellations should be countersigned and in case of illegibility the interpretation of engineer shall be final. All entries
8.0	All works item wise shall be measured upon completion and paid for at the rates quoted and accepted as per BHEL approved payment schedule/billing break-up.
9.0	The tender shall be deemed to have visited site and made himself aware of all the site conditions, studied the specifications and details of work to the done within the time schedule attached and to have acquainted himself of the
10.0	No splitting of the job is envisaged. Decision of BHEL in this regard shall be final and binding to the bidders.
11.0	Bidders are not allowed to alter the Price Schedule format including item description,quantity etc. and the offer is liable for rejection if the bidders submit their prices in Price Schedules modified by them. BHEL reserves the right to reject the offers of bidders who submit offers in Price Formats which are modiified/altered by them. Also putting any comments instead of rates/price in the designated column of the rate schedule shall make the offer liable for rejection.
12.0	Engineer's decision shall be final and binding on the contractor regarding clarification of items in the schedule with respect to the other sections/volumes of the contract.
13.0	Size and weights of various items are mentioned in the attached BOQ cum rate/price schedule for reference purpose only & these shall not be taken into consideration for quoting/calculating amount in the rate schedule. These shall be utilised as per relevant sections of tender. Bidders shall quote for each item in the rate column, taking unit as mentioned in the quantity column. Rates shall be filled in both figures and words. Amount shall be calculated based upon these rates multiplied by the mentioned quantity for the respective items.
14.0	Bidder's Total price shall be considered for evaluation unless stated otherwise.

VOLUME-III, PRICE SCHEDULE, REV-00

JOB: "ERECTION, TESTING & COMMISSIONING OF LTRH PENDENT COILS BANK, LTRH HORIZONTAL COILS BANK, ECONOMISER HORIZONTAL COILS BANK, LIFTING OF ECONOMISER OUTLET HEADER, REPLACEMENT OF 8 NOS. SEPARATOR SAFETY VALVE, SHORTENING OF LENGTH OF FSH REAR COIL ASSY., REMOVAL OF 3 PLATEN ASSEMBLIES (9TH, 17TH & 25TH FROM BOILER LEFT SIDE TO BE REMOVED) FROM PSH ASSY. & 144 HEADER END PLUGS/BLANKED ARE TO BE INSTALLED, WELDED AT THE END OF HEADER NIPPLES OF PSH ALONG WITH CUP LOCK SCAFFOLDING ARRANGEMENT AND ERECTION & DISMANTLING UPTO BOTTOM OF PSH, ALONG WITH CONNECTED ACCESSORIES AND HYDRAULIC TEST OF THESE NEW COILS ALONG WITH OTHER RELATED CIRCUITS OF BOILER, AH SOOT BLOWER PIPING & SUPPORTS, EXTENDED BACK PASS BOTTOM SUPPORTS, ECONOMISER ANTI VIBRATION BAFFLES & CASTABLE REFRACTORY FOR EXTENDED BACK PASS PANEL AT 2X660 MW NTPC BARH STAGE-II, U#5, BARH, PATNA, BIHAR".

E-TENDER NO.: PSER:PUR:BRH-S434:20 (ENQ:20:PP:0015:PUR:88) Date 05/03/2021.

SCH-1-TOTAL PRICE

SL. NO.	DESCRIPTION OF EQUIPMENT/ITEM	PRICE SCHEDULE REF	TOTAL PRICE (IN INR)
1.0	**GRAND TOTAL PRICE [FOR THE ENTIRE BILL OF QUANTITIES (BOQ) I.E. SUM OF ITEM SL. NO. 1 TO 13 GIVEN IN SCH-2 (WEIGHTAGE BREAK-UP OF TOTAL PRICE)] FOR "ERECTION, TESTING & COMMISSIONING OF LTRH PENDENT COILS BANK, LTRH HORIZONTAL COILS BANK, ECONOMISER HORIZONTAL COILS BANK, LIFTING OF ECONOMISER OUTLET HEADER, REPLACEMENT OF 8 NOS. SEPARATOR SAFETY VALVE, SHORTENING OF LENGTH OF FSH REAR COIL ASSY., REMOVAL OF 3 PLATEN ASSEMBLIES (9TH, 17TH & 25TH FROM BOILER LEFT SIDE TO BE REMOVED) FROM PSH ASSY. & 144 HEADER END PLUGS/BLANKED ARE TO BE INSTALLED, WELDED AT THE END OF HEADER NIPPLES OF PSH ALONG WITH CUP LOCK SCAFFOLDING ARRANGEMENT AND ERECTION & DISMANTLING UPTO BOTTOM OF PSH, ALONG WITH CONNECTED ACCESSORIES AND HYDRAULIC TEST OF THESE NEW COILS ALONG WITH OTHER RELATED CIRCUITS OF BOILER, AH SOOT BLOWER PIPING & SUPPORTS, EXTENDED BACK PASS BOTTOM SUPPORTS, ECONOMISER ANTI VIBRATION BAFFLES & CASTABLE REFRACTORY FOR EXTENDED BACK PASS PANEL AT 2X660 MW NTPC BARH STAGE-II, U#5, BARH, PATNA, BIHAR". DETAILS AS ENUMERATED IN THE TENDER.**	**SCH 2 - BREAK UP OF TOTAL PRICE**	TO BE FILLED ONLINE ONLY

NOTE:-	
1	Taxes & Duties shall be as per Annexure-I.
2	Bidder shall quote total price for total price of SCH-1- Part only at Sl No. 1 above. All other amounts / rates of each item of works in respective schedules / parts will be derived based on allocated percentages. As such, any uncalled figure/ amount noted at any other place / schedule of Volume-III will not be reckoned & will stand null & void.
3	Bidder to note that total price at Sl No. 1 above shall be considered for evaluation & awarding. As such grand total price should be complete in all respect for the full scope defined and considering all terms and conditions.
4	Based on the itemwise percentage allocations, the amount for the individual items of the Bill of Quantity shall be arrived at. The rates of individual items shall be derived from the amount against each items after rounding off upto 9 decimal places. However, RA bill payment shall be done after rounding off the gross amount to two decimal places. The item rates so derived shall remain firm till execution of the work under scope of this tender.
5	**The TOTAL QUOTED PRICE shall be "INCLUDING OF ALL TAXES & DUTIES, BUT EXCLUDING GST & BOCW CESS". GST & BOCW Cess shall be paid extra, as applicable.**
6	Any item as per scope of work, if not included in the Price quoted above and shown seperately will not be taken cognizance of and the offer shall be liable for rejection.

VOLUME-III, PRICE SCHEDULE, REV-00

JOB: "ERECTION, TESTING & COMMISSIONING OF LTRH PENDENT COILS BANK, LTRH HORIZONTAL COILS BANK, ECONOMISER HORIZONTAL COILS BANK, LIFTING OF ECONOMISER OUTLET HEADER, REPLACEMENT OF 8 NOS. SEPARATOR SAFETY VALVE, SHORTENING OF LENGTH OF FSH REAR COIL ASSY., REMOVAL OF 3 PLATEN ASSEMBLIES (9TH, 17TH & 25TH FROM BOILER LEFT SIDE TO BE REMOVED) FROM PSH ASSY. & 144 HEADER END PLUGS/BLANKED ARE TO BE INSTALLED, WELDED AT THE END OF HEADER NIPPLES OF PSH ALONG WITH CUP LOCK SCAFFOLDING ARRANGEMENT AND ERECTION & DISMANTLING UPTO BOTTOM OF PSH, ALONG WITH CONNECTED ACCESSORIES AND HYDRAULIC TEST OF THESE NEW COILS ALONG WITH OTHER RELATED CIRCUITS OF BOILER, AH SOOT BLOWER PIPING & SUPPORTS, EXTENDED BACK PASS BOTTOM SUPPORTS, ECONOMISER ANTI VIBRATION BAFFLES & CASTABLE REFRACTORY FOR EXTENDED BACK PASS PANEL AT 2X660 MW NTPC BARH STAGE-II, U#5, BARH, PATNA, BIHAR".

E-TENDER NO.: PSER:PUR:BRH-S434:20 (ENQ:20:PP:0015:PUR:88) Date 05/03/2021.

SCH-2 (WEIGHTAGE BREAK-UP OF TOTAL PRICE)

SL. NO.	DESCRIPTION OF WORK	UOM	QTY.	WEIGHTAGE FOR TOTAL PRICE OF EACH ITEM
1	Cutting & Removal of Pressure parts (Rear Wall tubes, Side Wall tubes, BP roof tubes, Buckstays on walls, LTRH Pendent loose tubes, Economiser term tubes, ECO and LTRH Hanger tubes, with Eco O/L headers with Link etc. as required for total retrofitting work as per scope, except for work involved in separotor safety valves, PSH & FSH). Note: For Separator Safety valve,PSH & FSH work, refer sl no 12 & 13 of this Price Sch.	MT	200	0.11049315
2	Restoration of cut portion of pressure parts (Rear wall tubes, Side Wall tubes, Buckstay on walls, repositioning of Eco O/L header with Links etc as required, except for work involved in Separator Safety Valve,PSH & FSH). Note: For Separator Safety valve,PSH & FSH work, refer sl no 12 & 13 of this Price Sch.	MT	90	0.04972192
3	Cutting and removal of Enclosures sheets, Insulation Wool, Sheeting, Iron Components, Castable and Pourable refractory as required for the total retrofitting work as per Scope (except for work involved in Separator Safety Valve,PSH & FSH). Note: For Separator Safety valve,PSH & FSH work, refer sl no 12 & 13 of this Price Sch.	MT	42	0.00683417
4	Restoration of Cut portion of Enclosure Sheets and replacement of removed Insulation and refractory with newly supplied materials (except for work involved in Separator Safety Valve,PSH & FSH). Note: For Separator Safety valve,PSH & FSH work, refer sl no 12 & 13 of this Price Sch.	MT	42	0.00976310
5	Erection of newly supplied pressure parts materials (coils with all attachements, Crown Plate Assemblies, suspensions, profile tubes for LRSB & doors, Piping for LRSB and Spool in ECO link) (except for work involved in Separator Safety Valve,PSH & FSH). Note: For Separator Safety valve,PSH & FSH work, refer sl no 12 & 13 of this Price Sch.			
5.1	Carbon Steel (including the items involved alloy steel joints of T12 in Hanger tubes only)	MT	320	0.17678903
5.2	Alloy Steel (the items involved alloy steel joints i.e. T12, T22, T-23 T-91 etc).	MT	465	0.25689656
6	Cutting and removal of of Non Pressure parts materials (Structure, for ease in erection of coils OR as per requirement of job) (except for work involved in Separator Safety Valve,PSH & FSH). Note: For Separator Safety valve,PSH & FSH work, refer sl no 12 & 13 of this Price Sch.	MT	40	0.01546905
7	Installation of Structure for new LRSB & new doors,New Structural members,floors, including restoration of cut structural parts etc., (except for work involved in Separator Safety Valve,PSH & FSH). Note: For Separator Safety valve,PSH & FSH work, refer sl no 12 & 13 of this Price Sch.	MT	100	0.05524657
8	AH Soot Blower Piping & Supports			
8.1	Removal of existing Air heater Soot Blowing Steam Supply piping OD 60.3 X 5.54 (P22) – approximately 250 mtrs along with the 6 Nos of Valves and Insulation	MTRS	250	0.00439104
8.2	Erection of new Air heater Soot Blowing Steam Supply piping OD 73 X 5.16 (P22) with necessary supports, 6 Nos of Valves and application of insulation – approximately 250 mtrs	MTRS	250	0.00506825
9	Extended back pass bottom supports			
9.1	Removal of Dog-house insulation and Refractory for installation of Extended back pass bottom support (approximately at an elevation of 65 metres)	MT	4	0.00112220
9.2	Restoration of Insulation/Refractory of extended back pass support on completion of installation of extended Back pass bottom support work	MT	4	0.00261846
9.3	Suitable modification of existing enclosure below the extended back pass panel (approximately at an elevation of 65 metres) By Installation of structures (beams, channels) as per the drawings supplied by BHEL Trichy	MT	16	0.01047384
10	Economizer Anti vibration baffles			
10.1	Installation of anti vibration baffles at 6 locations in the second pass of the boiler for all the four banks of economizer coils.	MT	30	0.02805493
11	Castable Refractory Application for extended back pass panel			
11.1	Application of castable refractory above extended backpass panel inside the boiler.	MT	30	0.00852734
12	Replacement of 8 no existing separator safety valve With newly supplied separator safety valves as per sl no 2.11 & other terms and condition of detalied scope of work of Annexure-I Redeuction of length of Final SH Rear Coil Assy (101 Nos) as per sl no 2.6.a of scope of work of Annexure-I Removal of 3 nos plateen assemblies (9th,17th & 25th from boiler left side to be removed), 144 nos. platen inlet and out let term tubes to be removed close to header, 144 nos. header end plugs are to be installed/ blanking to be welded at the end of header nipples as per sl no 2.6.b of scope of work of Annexure-I	LUMPSUM	1 LOT	0.23784796
13	Arrangement and erection & dismanting of cuplock scaffolding for first pass upto buttom of Platen Super Heater for the job of as per sl no 2.6.c of scope of work of Annexure-I	LUMPSUM	1 LOT	0.02068243
	TOTAL			**1.0000000**

NOTE	1. For detail activities/work involvement for the above BOQ sl no 1 to 13 of above Price Sch 2, Annexure -I (detailed scope of work) & other documents of tender have to be reffered.
	2. Item wise unit rate shall be calculated by dividing total amount (deduced based on allotted %) by total quantity. Payment shall be made for the actual quantities of work executed at the Unit Item rate thus deduced.
	3. Quantity of dismantling shall be considered equal to quantity of erection in respective areas wherever back to back replacement is applicable. In other areas whereever back to back replacement is not applicable, the old available erection shipping list of Boiler Unit-V shall be apllicable.
	4. Whereever dismantling and re-erection is done,particularly in area where temporary cutting of existing Platforms OR exension of platform for facilitating retrofitting work is done and materials not covered in shipping list then measurement of weight shall be as per actual standard weight.
	5. Payment for Welding/NDT/heat treatment (Pre Heat+ PWHT), wherever applicable as per EWS is part of work of above mentioned respective BOQ item weight/mtrs/lumpsum (as applicable). No separate payment will be made in this regard.
	6. NDT shall be 20% RT + 80% PAUT (Wherever 100% NDT is recomended)/ As per approved EWS.
	7. The BOQ SL. NO. 1 TO 11 of price SCH-2 are applicable for work involving in all areas other than work in Separator Safety valve,FSH & PSH area. For complete work involvement in Separator Safety Valve,FSH & PSH area, BOQ sl no 12, 13 will be applicable (respectively) only.

ANNEXURE-A

1.0	**Suspension of Business dealings with Suppliers/ Contractors**
1.1	BHEL reserves the right to take action against Suppliers/ Contractors who fail to perform or indulge in malpractices, by suspending business dealings with them.
1.2	Suspension of business dealings with Suppliers/ Contractors could be in the form of following: -- **a) Hold within the unit for specific item(s)/ material category(ies)/ type of work(s) for one year.** **b) Hold within the unit for all item(s)/ material category(ies)/ type of work(s) for two years** **c) Banning across BHEL for all items/ material category(ies)/ type of work(s) for three years.** The Supplier may be either put on hold or banned, as detailed hereinafter on the basis of one or more of the category wise reasons as enumerated hereunder.
1.3 1.3.1	**Hold within the unit for a specific item(s)/ material category(ies)/ type of work(s) shall be imposed in the following cases, if** i) In the last three consecutive supplies of a specific material category, average quality rating, as provided in the supplier performance rating (SPR) as per SEARP, falls below 80% of the quality weightage. This is irrespective of supplies against PO(s) having single/ multiple delivery schedules. Note: Not applicable in cases for erection works of Power Sector Regions, where separate guidelines for evaluation of capacity of bidders is being followed. ii) Two consecutive delays, for reasons of delay attributed to the Supplier, in execution of the contracts where delay occurred is such that a) prescribed maximum LD time limits of the contracts is exceeded or b)delay period has equaled/ exceeded half the original delivery period specified in the contracts whichever among the above is earlier. iii) a)Overall SPR (Supplier Performance Rating) in that particular Unit in line with SEARP falls below 60% of the specific material category. b)Bids of contractors (in PS-MSX portal) shall not be considered (if average score of last six months falls 60% or below as per guidelines for evaluation of capacity of bidders formula). Note: – for (b), No specific period of hold shall be applicable. iv) Supplier works are under strike/ lockout for a period of more than three months.

1.3.2	**Hold within the unit for all item(s)/material category(ies)/ type of work(s) shall be put in the following cases, if** i) Supplier tampers with tendering procedure affecting ordering process. ii) Supplier has misused BHEL documents/ drawings/ technical information or has breached the confidentiality agreement with BHEL. iii) after placement of order, Supplier fails to execute the contract. iv) within warranty period as per contract, Supplier continues to supply low/ less/ non-performing equipment/ services, repetitive failures, remains non-responsive. v) Wherever risk purchase clause (amounting to more than 5% of contract value) has been invoked. vi) After price bid opening but before placement of order, Supplier withdraws his offer or varies it in any manner within the validity period.
1.4	**Banning across BHEL shall be imposed in following cases, if**
1.4.1	i) –BLANK- ii) "Supplier is found to be responsible for submitting fake/ false/ forged documents, certificates, or information or misrepresentation/ wilful suppression of facts, or has resorted to unethical, illegal means or has forged BHEL documents, certificates etc. for securing business, meeting PQR or for enlistment in BHEL or with customers other than BHEL." iii) In spite of warnings, the Supplier persistently violates or circumvents the provisions of labour laws/ regulations/ rules or other statutory requirements. iv) Supplier is found to be involved in cartel formation or in any other act so as to influence the bidding process or influence the price. v) The Supplier has indulged in malpractices or misconduct such as bribery, corruption and fraud, pilferage, coercion etc. vi) The Supplier is found guilty by any court of law for criminal activity/ offences involving moral turpitude in relation to business dealings. vii)Supplier is found to have obtained any internal information/ documentation of BHEL by unauthorized means. viii) The foreign Principals along with the representing Agent shall be banned together if information submitted by them about their precise relationship, commission/ remuneration etc. payable/ receivable and other particulars as asked by BHEL, as per the extant guidelines regarding dealing with Agents of Foreign Suppliers is found false/ incorrect, at any stage. ix) Supplier has substituted, damaged, failed to return, or unauthorizedly disposed off free issue materials/ tools etc. of BHEL.
1.4.2	A Supplier can also be banned with the approval of Director (E, R&D) provided a direction to this effect has been received from the administrative ministry of the Government.

Note: Above shall be applicable along with Guidelines for "Suspension of Business dealings with Suppliers/ Contractors" available in BHEL website http://www.bhel.com. These shall form part of tender documents.

ANNEXURE-B

Certificate by Chartered Accountant on letter head

This is to Certify that M/S ....., (hereinafter referred to as 'company') having its registered office at ..... is registered under MSMED Act 2006, (Entrepreneur Memorandum (Part-II) / *UAM* / *Udyam Registration* No..... dtd: ....., Category: ..... (Micro/Small). (Copy enclosed).

Further verified from the Books of Accounts that the investment of the company as per the latest audited financial year ..... as per MSMED Act 2006 is as follows:

1. **For Manufacturing Enterprises:** Investment in plant and machinery (i.e. original cost **excluding land and building and the items specified by the Ministry of Small Scale Industries vide its** notification No.S.0.1722(E) dated October 5, 2006:
   Rs.....Lacs

2. **For Service Enterprises:** Investment in equipment (original cost excluding land and building and **furniture, fittings and other items not directly related to the service rendered or as may be notified under the MSMED** Act, 2006:
   Rs.....Lacs

3. ***For Enterprises (having EM-Part-II / UAM):*** *Investment in plant and machinery or equipment is Rs.....Lacs and turnover is Rs.....Lacs {as notified in MSME notification no. S.O. 2119 (E) dated 26-06-2020}.*

4. ***For Enterprises (Udyam, registered under Udyam Registration Portal):*** *Investment in plant and machinery or equipment is Rs.....Lacs and turnover is Rs.....Lacs {as notified in MSME notification no. S.O. 2119 (E) dated 26-06-2020}.*

(Strike off whichever is not applicable)

The above investment of Rs.....Lacs is within permissible limit of Rs.....Lacs for .....Micro I Small (Strike off which is not applicable) Category under MSMED Act 2006.

Or

The company has been graduated from its original category {Micro/Small) (Strike off which is not applicable) and the date of graduation of such enterprise from its original category is ..... (dd/mm/yyyy) which is within the period of 3 years from the date of graduation of such enterprise from its original category as notified vide S.O. No. 3322(E) dated 01.11.2013 published in the gazette notification dated 04.11.2013 by Ministry of MSME.

Date:

(Signature)

Name-

Membership number-

Seal of Chartered Accountant

ANNEXURE-C

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: NIT/Tender Specification No:

I/We,

_____

_____ declare that, I/We am/are not under insolvency resolution process or liquidation / BIFR or Bankruptcy Code Proceedings (IBC) as on date, by NCLT or any adjudicating authority/authorities, which will render us ineligible for participation in this tender.

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

Place:
Date:

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) NIT/Tender Specification No: ……,

I/We hereby submit the following information pertaining to relation/relatives of Proprieter/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 of the Authorized Signatory

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.

FORMAT FOR SEEKING CLARIFICATION

(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: **Request for Clarification**

Ref: 1) NIT/Tender Specification No: ……,
2) All other pertinent issues till date

Sl No	Reference clause of Tender Document	Existing provision	Bidder's query	BHEL's clarification
1				
2				
3				

Yours faithfully,

(Signature, date & seal of Authorized Representative of the Bidder)

FORMAT FOR DETAILS OF BIDDER

NAME OF BIDDER	
ADDRESS OF BIDDER	
Company Registration Number*	
Name of Partners / Directors	
Bidder Type Indian/ Foreign*	
City*	
State*	
Country*	
Postal Code*	
PAN/TAN Number*	
Company's Establishment Year	
Company's Nature of Business*	
Company's Legal Status* {limited company/undertaking/joint venture/partnership/other}	
Company Category* {micro unit as per MSME/small unit as per MSME/medium unit as per MSME/ UAN as per Udyog Aadhaar Memorandum/ Udyam Registration No. / Ancillary unit/project affected person of this company/SSI/ other} Relevant documents to be submitted as applicable.	
Enter Company's Contact Person Details Title(Mr. / Mrs. / Ms. / Dr. / Shri)*	
Contact Name*	
Date Of Birth*	
Correspondence Email* (Correspondence Email ID can be same as your Login ID. All the mail correspondence will be sent only to the Correspondence Email ID.)	
Designation	
Phone*	
FAX NO.	
Mobile*	

Form-1 (Format for local content)

Format for Self Certification regarding Local content (LC) for Product/ Services/ Works

Date:

_____ S/o, D/o, W/o _____, Resident of _____ do hereby solemnly affirm and declare as under:

That the percentage of local content for the Product/ Services/ Works offered by the bidder/supplier against the subject tender (TENDER NO: PSER:PUR:……..) is _____%. We certify that the item(s) offered meets the local content requirement for < Class-I Local Supplier / Class-II Local Supplier/ Non-Local Supplier, tick the applicable option >. We are also enclosing the details of the location(s) at which the local value addition is made.

That I agree to abide by terms and conditions of Department of Industrial Policy & Promotion issued vide Notification No: P-45021/2/2017-B.E.-II Dated: 15-06-2017 & P-45021/2/2017-PP (BE-II) Dated: 28-05-2018, of Department of Promotion of Industry and Internal Trade issued vide Notification No: P-45021/2/2017-PP(BE-II) Dated: 29-05-2019 & P-45021/2/2017-PP (BE-II) Dated: 04-06-2020.

That the information furnished hereinafter is correct to best of my knowledge and belief and I undertake to produce relevant records before the procuring entity or any other authority so nominated by the Government of India for the purpose of assessing the LC.

That the LC for all inputs which constitute the said Product/ Services/ Works has been verified by me and I am responsible for the correctness of the claims made therein

That in the event of the LC of the Product/ Services/ Works mentioned herein is found to be incorrect and not meeting the prescribed LC norms, based on the assessment of an authority so nominated by the Government of India and I will be liable as under clause 9 (f) of Public Procurement (Preference to Make in India) order 2017.

I agree to maintain all information regarding my claim for LC in the Company's record for a period of 2 years and shall make this available for verification to any statutory authorities

i. Name and details of the Local supplier (registered Office, Manufacturing and location, nature of legal entity)
ii. Date on which this certificate is issued
iii. Product / Services/ Works for which the certificate is produced
iv. Procuring agency to whom the certificate is furnished
v. Percentage of LC claimed.
vi. Name and contract details of the unit of the manufacturer
vii. Sale Price of the product
viii. Ex-Factory Price of the product
ix. Freight, insurance and handling
x. Total Bill of Material
xi. List and total cost value of inputs used for manufacture of the Products/ Services/ Works
xii. List and total cost of inputs which are locally sourced. Please attach LC certificates from local suppliers, if the input is not in-house.
xiii. List and cost of inputs which are imported, directly or indirectly

For and behalf of _____ <Name of Firm/ entity>

Authorized signatory of Firm/ entity
<Insert Signature, Stamp of Authorized signatory, Name, Designation & Contact No and date>

FORM – 2

(To be submitted in the bidder's letter head)

In-line with Department of Expenditure's (DoE) Public Procurement Division Order vide ref. F.No.6/18/2019-PPD dated 23.07.2020 & 24.07.2020

Job: "ERECTION, TESTING & COMMISSIONING OF LTRH PENDENT COILS BANK, LTRH HORIZONTAL COILS BANK, ECONOMISER HORIZONTAL COILS BANK, LIFTING OF ECONOMISER OUTLET HEADER, REPLACEMENT OF 8 NOS. SEPARATOR SAFETY VALVE, SHORTENING OF LENGTH OF FSH REAR COIL ASSY., REMOVAL OF 3 PLATEN ASSEMBLIES (9TH, 17TH & 25TH FROM BOILER LEFT SIDE TO BE REMOVED) FROM PSH ASSY. & 144 HEADER END PLUGS/BLANKED ARE TO BE INSTALLED, WELDED AT THE END OF HEADER NIPPLES OF PSH ALONG WITH CUP LOCK SCAFFOLDING ARRANGEMENT AND ERECTION & DISMANTLING UPTO BOTTOM OF PSH, ALONG WITH CONNECTED ACCESSORIES AND HYDRAULIC TEST OF THESE NEW COILS ALONG WITH OTHER RELATED CIRCUITS OF BOILER, AH SOOT BLOWER PIPING & SUPPORTS, EXTENDED BACK PASS BOTTOM SUPPORTS, ECONOMISER ANTI VIBRATION BAFFLES & CASTABLE REFRACTORY FOR EXTENDED BACK PASS PANEL AT 2X660 MW NTPC BARH STAGE-II, U#5, BARH, PATNA, BIHAR".

E-Tender No.: PSER:PUR:BRH-S434:20 (ENQ:20:PP:0015:PUR:88) Date 05/03/2021.

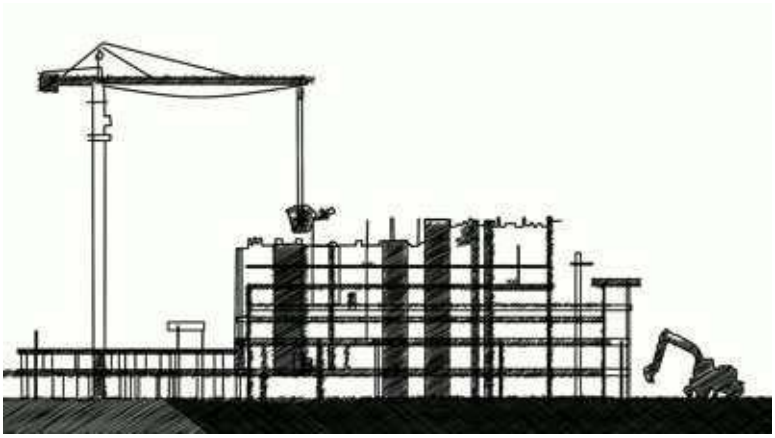
"I/We have read the clauses pertaining to Department of Expenditure's (DoE) Public Procurement Division Order (Public procurement no 1, 2 & 3 vide ref. F.No.6/18/2019-PPD dated 23.07.2020 & 24.7.2020) regarding restrictions on procurement from a bidder of a country which shares a land border with India; I/We hereby certify that I/We the bidder <Name of the Bidder……..> is/are not from such a country or, if from such a country, has been registered with the Competent Authority. I/We hereby certify that I/We the bidder fulfills all requirements in this regard and is eligible to be considered. [Where applicable, evidence of valid registration by the Competent Authority shall be attached]".

For and behalf of _____ (Name of the bidder)

(Signature, date & seal of authorized representative of the bidder)







HEALTH, SAFETY and ENVIRONMENT PLAN

For

SITE OPERATIONS

By

SUB-CONTRACTORS

POWER SECTOR- EASTERN REGION

DOCUMENT ISSUE SHEET

	PREPARED BY	APPROVED BY
NAME	Saswajeet Rout	Bishwanath Tirkey
DESIGNATION	Senior Engineer (HSE), PSER-HQ, Kolkata	Addl. GM (HSE), PSER-HQ, Kolkata
SIGNATURE	Saswajeet Rout	Bishwanath Tirkey
ISSUED BY: Saswajeet Rout, Sr. Engineer (HSE), PSER-HQ, Kolkata		
ISSUED TO: All sites of BHEL-PSER		
COPY NO: E-Copy		
DATE OF ISSUE: 08.05.2020		

THIS PLAN SUPERSEDES THE STANDARD HSE PLAN

HSE PLAN FOR SITE OPRATIONS BY BHEL'S SUBCONTRACTORS AT A GLANCE

BEFORE START

SIGNING OF MOU	
Agree to comply to HSE requirement- Statutory and BHEL's	Agree to accept BHEL's decision on release of 1.5% (as specified in the contract) of Gross bill Amount or part thereof or otherwise (non-release), based on our HSE performance as evaluated by BHEL during the execution period

PLAN

HSE ORGANISATION	
Manpower • **1 (one) safety officer for every 300 workers or part thereof** • **1(one) safety-supervisor for every 150 workers** • **1(one) safety-steward/ supervisor for every 50 workers** As per Cl. 7.1	**HSE Roles and responsibilities** • All employees as per 7.2.1 • Site In-charge & Package In-charges- As per clause 7.2.2 • Safety officer- As per clause 7.2.3

HSE Planning
for Man, Machinery / Equipment/ Tools & Tackles

PROVIDE

HSE INFRASTUCTURE	
• PPEs • Drinking Water • Washing Facilities • Latrines and Urinals • Provision of shelter for rest • Medical facilities	• Canteen facilities • Labor Colony • Emergency Vehicle • Pest Control • Scrapyard • Illumination • Crèches (if required)

TRAIN

HSE TRAINING , AWARENESS & PROMOTION	
Training • Induction training • Height work and other critical areas • Tool Box talk & Pep Talk • Job Specific Training	**Awareness & Promotion** • Posters & Signage • Emergency Contact/Information Display • Banner • Competition & Awards

COMMUNICATE

HSE COMMUNICATION	
Incident Reporting • Accident- Fatal, Major & Minor • Property damage • Near Miss **Safety Performance Reporting**	**Event Reporting** • Celebrations • Training • Medical camp • Motivational Activities

EXECUTE SAFELY

SAFETY DURING WORK EXECUTION

PERMIT TO WORK

Height work (above 2 meters), Hot Work, Heavy Lifting, Confined Space, Radiography, Excavation (More than 1.22 meters), Lockout / Tag out

OPERATIONAL CONTROL

• Welding, Gas Cutting Grinding • Rigging, Signaling • Cylinder- Storage & Movement • Demolition work • T&Ps • Chemical Handling • Electrical works • Painting	• Fire • Scaffolding • Height work • Working Platform • Excavation / Civil Work • Ladder • Lifting • Hoisting appliance • Hard Barricading

HOUSE KEEPING

WASTE MANGEMENT

TRAFFIC MANAGEMENT

ENVIRONMENTAL CONTROL

EMERGENCY PREPAREDNESS AND RESPONSE PLANNING

CHECKS

HSE AUDITS & INSPECTION

• Daily Checks • Inspection of Height work • Inspection of PPEs • Inspection of T & Ps	• Inspection of Cranes & Winches • Inspection of Welding and Gas cutting • Inspection of elevators etc.

HSE PERFORMANCE EVALUATION PARAMETERS

NON CONFORMANCE

PENALTY for NON CONFORMANCE
Refer Clause 16 Incremental penalty

For repeated violation by the same person, the penalty would be double of the previous penalty

For repeated fatal incident in the same contract / package, incremental penalty to be imposed. The subcontractor will pay 2 times the penalty compared to the previously paid in case there are repeated cases of fatal incidents under the same subcontractor for the same package in the same unit.

COMPENSATION TO ACCIDENT VICTIMS
Refer Clause 17
Employee Compensation Act, 1922
Other Acts and Guidelines relevant to employee compensation

ORGANIZATION OF THIS DOCUMENT

- ***GENERAL SECTION***
- ***SECTION A:***

  MAIN REQUIREMENTS APPLICABLE IN FULL

- ***SECTION B:***

  SPECIAL REQUIREMENTS

- ***ANNEXES***

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GENERAL

1. PURPOSE

1.0 The purpose of this HSE Plan is to provide for the systematic identification, evaluation, prevention and control of general workplace hazards, specific job hazards, potential hazards and environmental impacts that may arise from foreseeable conditions during installation and servicing of industrial projects and power plants.

1.1 This document shall be followed by BHEL's Sub-Contractors at all installation and servicing sites. In case BHEL has contractual HSE obligations towards customer, this document will be followed in conjunction with (BHEL's) customer specific requirements, ensuring that applicable systems, controls and checks of both are implemented in letter and spirit.

1.2 In case the customer has any specific requirement, the same is to be fulfilled but may not include financial inclusion.

1.3 This document shall be followed unless otherwise mentioned in TCC (technical condition of contract) or elsewhere in NIT or contract documents. This supersedes all HSE clauses in GCC.

1.4 Although every effort has been made to make the procedures and guidelines in line with statutory requirements, in case of any discrepancy relevant statutory guidelines must be followed.

2. SCOPE

The document is applicable on all activities and assets including managerial, supervisory, professional, technical, clerical and other workers including contract laborers; and equipment operating under the control of BHEL's Subcontractors at all installation / servicing activities of BHEL Power Sector as per the relevant contractual obligations.

3. OBJECTIVES

The HSE Plan reflects that BHEL places high priority upon the Occupational Health, Safety and Environment at workplaces. The Sub-contractor shall:

Health & Safety

- Prevent injury and ill health of all persons at site ('Persons' refers to all personnel including managerial, supervisory, professional, technical, clerical and other workers including contract laborers)

Environment

- Prevent pollution to environment and ensure protection of environment taking into account interested party concern and conservation of resources and reduction of wastage

Legal Requirements

- Comply at all times with the relevant statutory and contractual HSE requirements.

Planning & Resources

- Ensure that all work planning takes into account all persons that may be affected by the work.
- Ensure timely provision of resources to facilitate effective implementation of HSE requirements.

Competency, Training & Awareness

- Provide trained, experienced and competent personnel. Ensure medically fit personnel only are engaged at work.
- Provide all personnel with adequate information, instruction, training and supervision on the safety aspect of their work.

Maintenance of Equipment

- Ensure fitness testing of all T&Ps. Lifting appliances like cranes, chain pulley blocks etc. are certified by competent authority.

Safety during Operations

- Provide and maintain plant, places and systems of work that are safe and without risk to health and the environment.
- Effectively control, co-ordinate and monitor the activities of all personnel on the Project sites including subcontractors in respects of HSE.
- Establish effective communication on HSE matters with all relevant parties involved in the Project works.

HSE Improvement

- Capture the data of all incidents including near misses, process deviation etc. Investigate and analyze the same to find out the root cause
- Ensure timely implementation of correction, corrective action.
- Ensure continual improvement in HSE performance

GOALS AND TARGETS

- **To achieve "Zero Incident at Site" (LTI)**
- **100% compliance of all legal/statutory requirements related to HSE.**
- **100% Health, Safety and Environmental Induction training attendance for all workers.**
- **100% High Risk activities to be carried out only after approved Method Statement, HIRA / Aspect-Impact / JSA / OCP and Permit to Work are implemented.**
- **100% PPEs compliance in high and medium risk activities.**
- **100% monitoring of all Work Areas**
- **100% detection of non-conformities in work area and 100% closure within specified time**
- **100% incident (near miss, minor, major, other) reporting, recording and reviewing for corrective actions.**
- **Regular Safety Reviews to assess HSE program compliance and 100% closure of any recognized gaps to continually improve safety management and incident prevention.**

4. REFERENCES

1. ALL CONTRACTUAL HSE REQUIREMENTS INCLUDING THIS DOCUMENT
2. ALL APPLICABLE ACTS, RULES & REGULATIONS
3. BHEL POWER SECTOR HSE MANAGEMENT SYSTEM
   I. HSE PROCEDURES (13.1.1)
   II. WORK PERMITS (See Clause 13.1.2)
   III. OPERATIONAL CONTROL PROCEDURES (See Clause 13.1.3)
   IV. FORMATS (See Clause 21)
4. BHEL CORPORATE STANDARD PPE GUIDELINES
5. RELEVANT INDIAN STANDARDS FOR SAFETY (See Annexure 02)

(Note: Wherever, the date or revision number of a document is not mentioned, latest revision is implied)

5. BHEL HEALTH, SAFETY & ENVIRONMENT POLICY:

In BHEL, Health, Safety and Environment (HSE) responsibilities are driven by our commitment to protect our employees and people we work with, community and environment. BHEL believes in zero tolerance for unsafe work/non-conformance to safety and in minimizing environmental footprint associated with all its business activities. We commit to continually improve our HSE performance by:

- Developing safety and sustainability culture through active leadership and by ensuring availability of required resources.
- Ensuring compliance with applicable legislation, regulations and BHEL systems.
- Taking up activities for conservation of resources and adopting sound waste management by following Reduce/Recycle/Reuse approach.
- Continually identifying, assessing and managing environmental impacts and Occupational Health & Safety risks of all activities, products and services adopting approach based on elimination/ substitution/reduction/control.
- Incorporating appropriate Occupational Health, Safety and Environment criteria into business decisions, design of products & systems and for selection of plants, technologies and services.
- Imparting appropriate structured training to all persons at workplace and promoting awareness amongst customers, contractors and suppliers on HSE issues.
- Reviewing periodically this policy and HSE Management Systems to ensure its relevance, appropriateness and effectiveness.
- Communicating this policy within BHEL and making it available to interested parties.



Atul Sobti
Chairman & Managing Director

6. TERMS AND DEFINITIONS

6.0 INCIDENT

Work- related or natural event(s) in which an injury or ill health (regardless of severity) or fatality, damage to property/environment occurred, or could have occurred.

6.1 NEAR MISS

An incident where no ill health, injury, damage or other loss occurs, but it had a potential to cause, is referred to as “Near-Miss incident”.

6.2 MAN-HOURS WORKED

The total number of employee hours worked by all employees including subcontractors working in the premises.
It includes managerial, supervisory, professional, technical, clerical and other workers including contract laborers.
Man-hours worked shall be calculated from the payroll or time clock recorded including overtime. When this is not feasible, the same shall be estimated by multiplying the total man-days worked for the period covered by the number of hours worked per day. The total number of workday for a period is the sum of the number of men at work on each day of period. If the daily hours vary from department to department separate estimate shall be made for each department and the result added together.

6.3 FIRST AID CASES (FAC)

First aid cases include:

1. Visit to a physician or a licensed health care professional solely for observation or counselling
2. Conduct of diagnostic procedures like X rays, blood test including the prescription medications used solely for diagnostic purposes (e.g. eye drops to dilate eyes)
3. Using a non-prescription medicine at non-prescription strength (for medication available in both prescription and non-prescription form as recommendation by a physician or other licensed health care professional to use a non-prescription medication at prescription strength is considered medical treatment for record keeping purposes};
4. Administering tetanus immunizations (other immunizations, such as Hepatitis B vaccine or rabies vaccine, are considered medical treatment);
5. Cleaning, flushing or soaking wounds on the surface of the skin;
6. Using wound coverings such as bandages, Band-Aids TM, gauze pads, etc.; or using butterfly bandages or Steri-Strips TM (other wound closing devices such as sutures, staples, etc., are considered medical treatment);
7. Using hot or cold therapy;
8. Using any non-rigid means of support, such as elastic bandages, wraps, non-rigid back belts, etc. (devices with rigid stays or other systems designed to immobilize parts of the body are considered medical treatment for record-keeping purposes);

9. Using temporary immobilization devices while transporting an accident victim (e.g., splints, slings, neck collars, back boards, etc.).
10. Drilling of a fingernail or toenail to relieve pressure, or draining fluid from a blister;
11. Using eye patches;
12. Removing foreign bodies from the eye using only irrigation or a cotton swab;
13. Removing splinters or foreign material from areas other than the eye by irrigation, tweezers, cotton swabs or other simple means;
14. Using finger guards;
15. Using massages (physical therapy or chiropractic treatment are considered medical treatment for recordkeeping purposes); or
16. Drinking fluids for relief of heat stress.

No other treatments are considered first aid.

6.4 MEDICAL TREATMENT CASES (MTC)

An incident involved with an injury or illness that needs medical attention beyond First-aid as per 6.3 above.

6.5 **Dangerous Occurrence** is defined as:

(1) Collapse or failure of lifting appliances or hoist or conveyors or other similar equipment/machine;
(2) Collapse or failure of a crane, derrick, winch, hoist or other appliance used in raising or lowering persons or goods or any part thereof, or the overturning of a crane;
(3) Explosion or fire causing damage to the structure of any room or place in which persons are employed, or to any machine or plant, resulting in the complete suspension of ordinary work;
(4) Electrical short circuit or failure of electrical machinery, plant or apparatus, attended by explosion or fire, causing structural damage involving its stoppage or disuse;
(5) Explosion of a receiver or container used for the storage at a pressure greater than atmospheric pressure of any gas or gases (including air) or any liquid or solid resulting from the compression of gas;
(6) Collapse in whole or part from any cause whatsoever of any roof, wall, floor, Structure or foundation forming part of the construction site in which persons are employed;
(7) Total or partial collapse of any overburden, face, tip or embankment on the Construction site;
(8) The overturning of, or collision with any object by any bulldozer, dumper, excavator, grader, lorry or shovel loader, or any mobile machine used for the handling of any substance on the construction site.

6.6 **Fire**: Except Dangerous occurrence, any incident involving fire.

6.7 **Property Damage**: Except Dangerous Occurrences and Fire, any incident of property (materials, building, equipment etc) getting damaged.

6.8 TYPE OF INCIDENT / ACCIDENT & THEIR REPORTING:

The categories of Incident / accident are as follows:

Non-Reportable Cases or NON-LTI: (Including First-aid cases as per 6.3 and MTC as per 6.4)

Minor: In this case the injured person resumes duty within 48 hours of incident.

Reportable Cases (LTI or Loss Time Injury Cases):

Major: In this case the injured person is disable for 48 hours or more and is not able to perform his duty. (as per IS 3786). It includes fatality.

All incidents must be reported orally immediately and in writing within 24 hours of time of incident. However, in case of fatality, it shall be reported to the statutory authority within prescribed timeline through proper channel. Internal reporting shall be done within 6 hours of time of the incident

6.9 TOTAL REPORTABLE FREQUENCY RATE

Frequency rate is the number of Reportable Lost Time Injury (LTI) per one Million Man hours worked. Mathematically, the formula read as:

$$\frac{\text{Number of Reportable LTI}}{\text{Total Man Hours Worked}} \times 1{,}000{,}000$$

6.10 SEVERITY RATE

Severity rate is the Number of days lost due to Lost Time Injury (LTI) per one Million Man hours worked. Mathematically, the formula reads as:

$$\frac{\text{Days lost due to LTI}}{\text{Total Man Hours Worked}} \times 1{,}000{,}000$$

6.11 FREQUENCY SEVERITY INDEX (FSI)

Frequency Severity Index, FSI $= \sqrt{FR * SR/1000}$

6.12 INCIDENCE RATE

Incidence Rate is the Number of LTI per one thousand manpower deployed. Mathematically, the formula reads as:

$$\frac{\text{Number of LTI}}{\text{Average number of manpower deployed}} \times 1000$$

6.13 JOB SAFETY ANALYSIS

A job safety analysis (JSA) is a procedure which helps integrate accepted safety and health principles and practices into a particular task or job operation. In a JSA, each basic step of the job is to identify potential hazards and to recommend the safest way to do the job. Other terms used to describe this procedure are job hazard analysis (JHA) and job hazard breakdown.

6.14 SAFETY WALK

It's a walk (conducted periodically) by an official through a portion or whole of a site as an HSE officer, noting down HSE observations, speaking to concerned workmen and supervisor on observation, recording and reporting to in charges of agencies, getting the same rectified with personal follow up - to send out a strong message on Management's commitment to safety.

6.15 HEAVY & COMPLEX LIFTING

A heavy and complex lifting activity includes:

1. Lifting above 50 Tons
2. Tandem Lifting using multiple cranes
3. Total load exceeding 75% of capacity of crane
4. Lift of unusual difficulty or geometry or rigging
5. Lift over operating units
6. Any other lift as decided by site HSE / Erection

In any case, Job Safety Analysis to be carried out for any lift above 5 Tons.

6.16 SAFETY COMMITTEE

As per the BOCW, Safety Committee shall be constituted if there are more than five hundred or more construction workers are employed at any site. As per the Factories Act, 1948 it is for 250 workers. It shall be represented by equal number of representatives of employer and construction workers.

6.17 NIGHT WORK

Work conducted after sunset when only a fraction of total manpower is available

Section-A

Main Requirements

(Applicable in Full)

7. HSE ORGANISATION

7.1 DEPLOYMENT

7.1.1 Minimum Number (Availability per contract / package per Working Shift)

7.1.1.1 HSE Officer	7.1.1.2 HSE Supervisor	7.1.1.3 HSE Steward / Observer
1 per 300 workers or part thereof as a minimum or as mandated by applicable legal requirements, whichever more stringent	1 per 150 workers or part thereof	1 per 50 workers or part thereof

7.1.1.4 The safety officers shall be engaged directly by the sub-contractor, whereas safety supervisors and safety stewards may be from the agencies engaged by the sub-contractor.

7.1.1.5 Deployment Plan:

7.1.1.5.1 These shall be minimum one HSE officer along with HSE supervisor and HSE steward in the aforesaid ratio for every shift for each unit of Boiler/ESP/Power House & TG/ Chimney/ Whole of Cooling Tower.

7.1.1.5.2 For Civil works and other BOP items, deployment shall be broadly as specified in the above table. But BHEL shall finally approve the deployment based on nature and volume of jobs, Risks and hazards associated etc.

7.1.1.5.3 The deployment plan of Safety manpower at various locations shall be submitted to BHEL for approval by subcontractor

BHEL reserves the right to demand more safety personnel than what is stipulated here and change the deployment pattern

7.1.2 QUALIFICATION & EXPERIENCE

All Degrees/ Diplomas shall be recognized by State Council for Technical Education & Vocational Training (SCTE & VT) / All India Council for Technical Education (AICTE) / University

7.1.2.1 HSE Officer	7.1.2.2 HSE Supervisor	7.1.2.3 HSE Steward / Observer
A. i. Recognized degree in any branch of Engg. or Tech. or Architecture with practical experience of working in a building or other construction work in supervisory capacity for a period of not less than two years, or Recognized diploma in any branch of Engg. or Tech with practical experience of working in a building or other construction work in supervisory capacity for a period of not less than five years. ii. Recognized degree or diploma in Industrial safety ii. (Preferably) have adequate knowledge of the language spoken by majority of the workers at the construction site. **Alternatively:** B. Graduation Degree in Science with Physics & Chemistry and degree or diploma in Industrial Safety (from any Indian institutes recognized by AICTE or State Council of Tech. Education of any Indian State) with practical experience of working in a building, plant or other construction works (as Safety Officer, in line with Indian Factories Act, 1958) for a period of not less than five years.	As a minimum, (s)he shall possess: A recognized graduation Degree in Science (with Physics & Chemistry) or a recognized diploma in Engg. or Tech. with: a. Minimum Two years of practical experience in construction work environment and b. Should possess requisite skills to deal with construction safety & fire related day-to-day issues.	As a minimum, (s)he shall possess: 1. Class XII pass certificate and 2. Trained in fire-fighting as well as in safety / occupational health related subjects, with: a. Minimum two year of practical experience in construction work environment and b. Should have adequate knowledge of the local language spoken by majority of the workers at the construction site.

7.1.3 HSE IN-CHARGE

In case there are more than one HSE Officers with any subcontractor, one of them, who is senior most by experience (in HSE discipline), may be designated a s HSE In-Charge. Duties & responsibilities of such person shall be commensurate with that of relevant statute and primarily to coordinate with top management of Client and subcontractors.

7.1.4 AVAILABILITY AND PENALTY FOR NON-DEPLOYMENT:

Subcontractor shall ensure physical availability of safety personnel at the place of specific work location including where Height Work Permit is required/granted. No work shall be started in any area until above safety personnel & concerned Site Engineer of subcontractor are physically deployed at site.
The Subcontractor shall prepare an organization chart identifying the areas of operations, responsibilities and reporting structure of all safety personnel and submit the same to BHEL.

The subcontractor shall deploy sufficient safety officers, supervisors and safety-stewards, as per numbers & qualifications mandated in this Section since mobilization of first batch of manpower and add more in proportion to the added strength in work force. Any delay in deployment will attract a penalty at following rates:

Non-deployment of HSE Officer	–	**Rs 50000 per man-month**
Non-deployment of HSE Supervisor	–	**Rs 30000 per man-month**
Non-deployment of HSE Steward	–	**Rs 20000 per man-month**

Penalty shall be collected for the period of non-availability of safety personnel after allowing a grace period of 15 days for finding a replacement.

7.1.5 QUALIFICATION OF CRANE & WINCH OPERATORS, DRIVERS etc.:

The Crane and Winch Operators, Drivers, Riggers and other professionals deployed shall be qualified and experienced, and have valid license for the class of vehicle / machinery as applicable. The sub-contractor shall certify competence of these persons.in writing as and when they join.
Crane/Winch operator should have certificate on subject course or owner experience certificate in letterhead.

7.1.6 In case the statutory requirements i.e. State or Central Acts and / or Rules as applicable like the Building and Other Construction Workers' Regulation of Employment and Conditions of Service- Act,1996 or State Rules (wherever notified), the Factories Act, 1948 or Rules (wherever notified), etc. are more stringent than above clarifications, the same shall be followed.

7.1.7 **BILLING:** Deployment of Safety manpower as per this clause **shall be** a billable item.

7.1.8 The Subcontractor shall verify & authenticate credentials of the HSE personnel detailed in this Section and furnish Bio-Data/Resume / Curriculum Vitae of the safety personnel as above for BHEL / Owner's approval, at least 1 month before the mobilization. The Subcontractor, whenever required, shall arrange submission of original testimonials / certificates of their Safety personnel, to BHEL / Owner (for verification/scrutiny, etc.)

7.1.9 Prior approval of CVs by BHEL for Safety Officer and Safety Supervisor is mandatory, however BHEL has right to check suitability of Safety Stewards as well.

7.2 HSE RESPONSIBILITIES

The subcontractors shall communicate the HSE responsibilities as indicated in this section to relevant employees in written Form and ensure awareness of the same

7.2.1 ALL EMPLOYEES

1. To be aware of, get involved in and ensure implementation of all HSE related Systems and Procedures including but not limited to:

    a) BHEL HSE Management System including HSE Procedures and OCPs
    b) Work Permit System
    c) Emergency Preparedness Response Plans
    d) Contractual HSE requirements
    e) Legal Requirements
    f) Penalty System
    g) Training requirements
2. To ensure that the persons engaged in respective area follow the safety rules like using appropriate PPEs.
3. To keep track of repetitive minor or major incident observation/ report and submit to BHEL.
4. To prepare HIRA / JSA as required and submit to BHEL for verification.
5. To record all incidents including near miss and report to BHEL.
6. To adopt safe working practices at all times and act as role model for Safety
7. To take immediate corrective action actions in case any non-conformity is observed on product / process / system with respect to Occupational Health, Safety and Environment.
8. In case any particular activity / work has extremely high consequential risk or high environmental impact, same shall be brought to the notice of BHEL Package In-charge before starting the work.
9. To interfere/ stop work as & when identified unsafe.
10. To maintain & promote improved level of house-keeping all the time at site.
11. To support/co-operate with audit team members as & when safety audits are carried out.
12. To involve in investigation, if any incident occurs in his work area.
13. To participate in safety promotional programmes.
14. To attend the safety committee meeting, if member/ invitee
15. To ensure that only fit T&Ps and qualified persons are engaged for all activities.
16. Shall ensure that person working above 2.0 meter should use Safety Harness tied to a life line/stable structure.
17. Shall ensure that materials are not thrown from height. Cautions to be exercised to

prevent fall of material from height.

18. Shall ensure that all T&Ps engaged are tested for fitness and have valid certificates from competent authorities.

7.2.2 SITE IN –CHARGE & PACKAGE IN-CHARGES OF SUBCONTRACTOR

1. All requirements as per 7.2.1
2. **Shall ensure fulfillment of HSE requirements of BHEL contract as given in this document.**
3. Shall engage qualified safety manpower as per this document at all times.
4. Shall adhere to the rules and regulations mentioned in this document, practice very strictly in his area of work in consultation with his concerned engineer and the safety coordinator.
5. Shall screen all workmen for health and competence requirement before engaging for the job and periodically thereafter as required.
6. Shall ensure that all the workers are engaged after undergoing induction training.
7. Shall arrange for all necessary PPEs like safety helmets, belts, full body harness, shoes, face shield, hand gloves etc. before starting the job. Shall ensure that no working men /women carry excessive weight more than stipulated in Factory Rule Regulation R57.
8. Shall ensure that provisions stipulated in contract Labor Regulation Act 1970, Chapter V C.9, canteen, rest rooms/washing facilities to contracted employees at site.
9. Shall report all incidents (Fatal/Major/Minor/Near Miss) to the Site engineer /HSE officer of BHEL.
10. Shall conduct Safety Walks and safety inspections, and act as a role model for Safety.
11. Shall ensure that Horseplay is strictly forbidden.
12. Shall ensure that adequate illumination is arranged during night work.
13. Shall ensure that all personnel working under subcontractor are working safely and do not create any Hazard to self and to others.
14. Shall ensure display of adequate signage/posters on HSE.
15. Shall ensure that mobile phone is not used by workers while working.
16. Shall ensure conductance of HSE audit, mock drill, medical camps, induction training and training on HSE at site.
17. Shall ensure full co-operation during Client/External /Customer HSE audits.
18. Shall ensure submission of look-ahead plan for procurement of HSE equipment’s and PPEs as per work schedule.
19. Shall ensure adequate valid fire extinguishers are provided at the work site.
20. Shall ensure availability of sufficient number of toilets /restrooms and adequate drinking water at work site and labor colony.
21. Shall ensure adequate emergency preparedness
22. Site In-charge also involve in the induction training so as to share knowledge of some incident and guide the worker to perform work safely.
23. Shall ensure power source for hand lamps shall be maximum of 24 v.
24. Shall ensure temporary fencing should be done for open edges if Hand – railings and Toe-

guards are not available.

25. Shall be responsible for the periodic testing of T&Ps (winches / crane /hydra/tools/equipment so on.) and Pressure Vessels as per applicable codes and submit report to BHEL
26. Shall be member of site HSE committee and attend all meetings of the committee

7.2.3 HSE OFFICER OF SUBCONTRACTOR

1. All requirements as per 7.2.1
2. Carry out safety inspection of Work Area, Work Method, Men, Machine & Material, P&M and other tools and tackles.
3. Facilitate HIRA and Aspect/Impact Study in the area and ensure control measures.
4. Highlight the requirements of safety through Tool-box / other meetings.
5. Help concerned HOS to prepare Job Specific instructions for critical jobs.
6. Maintain record and conduct investigation of all incident/dangerous occurrences & recommend appropriate safety measures.
7. Advice & co-ordinate for implementation of HSE permit systems, OCPs & MPs.
8. Convene HSE meeting & minute the proceeding for circulation & follow-up action.
9. Plan procurement of PPE & Safety devices and inspect their healthiness.
10. Report to BHEL on all matters pertaining to status of safety and promotional programmes at site level.
11. Encourage raising Near Miss Report on safety along with, improvement initiatives on safety.
12. Facilitate administration of First Aid
13. Facilitate screening of workmen and safety induction.
14. Conduct fire Drill and facilitate emergency preparedness
15. Design campaigns, competitions & other special programs to promote safety in the workplace.
16. Notify non-conformance to safety norms observed during site visits / site inspections.
17. Recommend to Site In-charge, immediate discontinuance of work until rectification, of such situations warranting immediate action in view of imminent danger to life or property or environment.
18. To decline acceptance of such PPE / safety equipment that do not conform to specified requirements.

7.2.4 HSE SUPERVISOR OF SUBCONTRACTOR

1. All requirements as per 7.2.1
2. To assist Safety officer

7.2.5 HSE STEWARD / OBSERVER OF SUBCONTRACTOR

1. All requirements as per 7.2.1
2. To monitor allotted area for Safety violations, take required action and inform the concerned Safety Supervisor / Officer

3. To assist Safety Officer and Safety Supervisor

7.2.6 HSE DOCUMENTS, SYSTEMS & PROCEDURES:

BHEL shall provide the subcontractor soft copies of all applicable HSE Procedures, Work Permits, Operational Control Procedures, Formats and any other instructions required for the implementation of HSE Management System before commencing operations at site. Subcontractor shall ensure the availability of the same.

7.2.7 IMPORTANT SITE EHS RULES RESULTING IN POSSIBLE EXPULSION FROM SITE

- Pre-employment Medical fitness is compulsory for all workers.
- EHS induction in mandatory for all new workers, supervisor and engineers, subcontractor managers etc.
- No visitors are allowed for site visit without safety induction.
- **Mandatory PPEs are**

  - ✓ *Safety helmet,*
  - ✓ *Hard toe safety shoes,*
  - ✓ *Safety glasses*
  - ✓ *Reflective vest*
  - ✓ *Full/half sleeve (at least 4-inch-long) shirt*
  - ✓ *Full length pant/trousers for male and preferably Salwar Kameez for female*

- **Zero Tolerance Safety Rules**

  - Violation of Fall protection / not anchoring & wearing safety harness above 6 feet,
  - Work without PTW
  - Child labor at site

- Restricted Use of cell phone in the working zone, operating vehicle/crane and at height. Encourage the people not to bring mobile phones inside the project premises.
- All vehicle being used at site to be in good condition in all respect.
- All electrical installations should have individual 30 mA ELCBs
- **Fighting**: Fighting anywhere on the Project site, including in parking areas, is strictly forbidden; violators will be barred from site and possibly subjected to legal action by local authorities.
- **Horseplay**: Running, pushing, practical jokes, and other horseplay are forbidden on the project site, including in parking areas.
- **Gambling**: Gambling on the Project site is not permitted
- **Alcohol & Drugs**: Intoxication or possession of alcohol or illegal drugs is strictly forbidden.
- **Weapons**: Possession of weapons on the Project site is strictly prohibited
- **Asbestos Material**: No asbestos material is allowed to use in Project Site
- **Hair**: Anyone working on site property with scalp hair longer than the top of his/her shoulders must tie-up and restrains the hair within the hard hat or coveralls, shirt or jacket collar.
- **Jewelry**: Loose necklaces, dangling earrings and bracelets shall not be worn when working on the Project site.

- **Contact Lens**: While the site does not prohibit the wearing of contact lens, BHEL Project does not recommend their use.

- **Use of Empty Drums**: Use of empty drums to climb up and work is banned. Proper stool/ ladder/ stage required to be used if intended to work at height.
- Projects must comply in full with all applicable EHS local and national legislation. In circumstances where there is a conflict between local or national legislation and client requirements, the higher (more protective) requirement must prevail.
- All persons working on suspended scaffolds/cradles/gondolas must wear and use appropriate fall prevention equipment so as to protect them effectively at all times when they are at risk from any failure of any part of the scaffold/cradle/gondola, including its suspension system

- **Construction Trucks/Vehicles**

  - ✓ Vehicles must be equipped with proper seat belts for driver and passengers. All persons riding in vehicles must be advised of the requirement that seat belts are to be used whenever the vehicles are being operated.
  - ✓ The subcontractor is responsible for assuring the overall safe condition of vehicles assigned to its projects.
  - ✓ The speed limit on the project site is a maximum of 20 Km/hr.
  - ✓ Any person found operating or driving in a reckless or careless manner without regard for the safety of other employees or the general public will be immediately removed for the equipment they were operating and permanently prohibited from operating or driving any equipment on the project.
  - ✓ Any mobile equipment found to be unsafe or defective must be immediately removed from service and sent for repair or replacement. The subcontractor must ensure that the proper repairs have been made prior to putting the equipment back into service.

- **Construction Material Handling Heavy Equipment**

  - ✓ No equipment may be modified without equipment manufacturer's authorization.
  - ✓ Rollover Protective Structures must be provided for all equipment as required.
  - ✓ Seat belts must be provided and used by operators of all equipment that has a Rollover Protective Structure.
  - ✓ All bi-directional equipment must be equipped with an operable horn that must be used as needed when the machinery is moving in either direction.
  - ✓ All bi-directional equipment must also have an operable alarm in addition to the horn.
  - ✓ All equipment must be provided with a multi-purpose (class A, B, and C) fire extinguisher mounted in an easily accessible location.
  - ✓ Braking systems, controls, safety devices must be maintained in effective operating condition.
  - ✓ The operator must inspect the equipment at the beginning of the shift and test for acceptable

- ✓ operation as per the equipment's manufacturer's instructions. Inspections must be documented and filed.
- ✓ Only qualified personnel must be allowed to operate equipment. Qualification must be documented and filed.

In case any worker violates any of the EHS rules identified by BHEL as above, following punitive action shall be taken:

First Offence	Second Offence	Third Offence	Fourth Offence
Oral warning	*Gate Pass Punched*	*Gate pass punched (second)*	*Gate Pass Punched(third) and person sent out of the gate* *Photo of concerned worker to be displayed on Notice boards and prominent locations.*

BHEL has the right to send out such person even earlier than fourth offence after considering the severity of the offence and/or the persons track record related to following general/EHS rules.

BHEL reserves right to expel even concerned supervisor or engineer as well in case of repeat of such cases of indiscipline.

Note:
The appellate authority in this case shall be the BHEL Site In-charge whose decision shall be final on the matter and binding on all parties.

8. PLANNING FOR HSE

A. Identifying Hazards / Risks & Aspects / Impacts and implementing control measures

1. Subcontractor shall identify all OHS Hazards and Risks applicable to all activities in scope as per *HSEP01: HSE Procedure for OHS Hazards and Risks*, and plan & implement the required control measures.

2. Subcontractor shall identify all Environmental Aspects and Impacts applicable to all activities in scope as per *HSEP02: HSE Procedure for Environmental Aspects and Impacts*, and plan & implement the control measures.

B. Register of Regulations:

Subcontractor shall prepare a register of applicable rules and regulations in the scope as per

HSEP03: HSE Procedure for Register of Regulations and plan to ensure compliance.

The detailed plans and registers in A and B to be submitted to BHEL for review and approval within 60 days of start of work at site.

Note: The plans above are dynamic and shall be periodically reviewed as per BHEL requirement.

8.1 MOBILISATION OF MACHINERY / EQUIPMENT / TOOLS

1. Subcontractor shall furnish to BHEL, the Test Certificates issued by the jurisdictional competent persons of machinery, equipment and other T&Ps to be deployed at site, before deployment. BHEL reserves the right to disallow the same if found non-conforming to HSE / legal requirements

2. As a further measure to ensure that machinery, equipment and tools being mobilized to the construction site are fit for purpose and are maintained in safe operating condition and comply with legislative and owner requirement, inspection shall be arranged by in-house expert / competent authority (preferable) for acceptance. (**Report Format: HSEP:14-F15)**

3. **The equipment considered for this purpose shall include all those in the T&P list in the tender document. Conventional Hydra crane with carriage in front shall not be permitted. Other models like FX or TRX series of Escorts or equivalent shall be permitted.**

4. In the course of work, the subcontractor shall notify the BHEL Engineer, of his intention to bring on to site any equipment or any container, with liquid or gaseous fuel or other substance which may create a hazard.

5. The Engineer shall have the right to prescribe the condition under which such equipment or container may be handled and used during the performance of the works and the subcontractor shall strictly adhere to such instructions.

6. The Engineer shall have the right to inspect any construction tool and to forbid its use, if in his opinion it is unsafe. No claim due to such prohibition will be entertained.

7. Following items should be only ISO certified and not more than 2 yr. of purchase
    i. Chain pulley block
    ii. Wire rope slings
    iii. Grinding machine and wheel and buffing wheel
    iv. Gas cutting equipment
8. Following equipment should not be more than 5 Yr. old
    1. Welding machine
    2. Vibrator Machine
    3. Concrete cutter
    4. DB/Electrical panel
9. **Office Infrastructure** - subcontractor shall arrange a computer / Laptop with Network

connection, chair and table for HSE Staff to facilitate HSE reporting and recordkeeping.

8.2 MOBILISATION OF MANPOWER

1. As a measure to ensure that manpower being mobilized to the construction site is fit and competent for safe working, screening arrangement shall be made by the sub-contractor to ensure fulfillment of contractual as well as legislative requirement by:

i. Ensuring the required qualification/ training/ certification/ license and experience for the job as per Section 7 of this document & applicable legal requirements

ii. **Medical Checkup:** Examination of medical fitness shall be conducted through qualified medical professional for all workers to be deployed. (Record: Format No. HSEP14:F02)**.** For height workers, height phobia test to be carried out as qualification criteria.

iii. **Induction Training:** Induction training of all workers to be ensured as per clause 9.1 and HSEP04: *HSE Procedure for Training & Awareness (Record:* Format No. HSEP14:F03)

Only on successfully meeting above criteria, permanent gate passes to be issued.

2. The subcontractor shall strictly adhere to the maximum daily working hours and other requirements as per applicable laws and shall not engage any employee below 18 years of age.
3. The subcontractor shall take special care of the employees affected with occupational diseases under rule 230 and schedule II of BOCW Rules. The employees not meeting the fitness requirement should not be engaged for such job.
4. Ensure that the regulatory requirements of excessive weight limit (to carry / lift / move weights beyond prescribed limits) for male and female workers are complied with.
5. System for Issue of Gate Passes to authorized personnel only shall be ensured at site
6. The subcontractor shall keep accurate and updated records of all manpower preferably in soft form
7. The subcontractor shall ensure appropriate infrastructure for workers as per Clause 8.4.

8.3 PROVISION OF PPEs

1. Adequate numbers of Personnel Protective Equipment (PPEs), will be made available at site & their effectiveness and regular use by all will be ensured

2. The PPEs shall conform to the relevant standards as listed in Annexure 02, and bear ISI mark.

3. The following matrix recommends usage of minimum PPEs against the respective job. For details, the respective OCPs to be referred.

Sl. No	Type of work	Suggested PPEs
1	Work at height	Double lanyard full body harness with rope grab (as applicable), retractable Fall arrestor (specific cases), Safety nets (single / double)
2	Concrete and asphalt mixing	Nose mask, hand glove, apron, gum boot, goggles
3	Welders/ Grinders/ Gas cutters	Welding/face screen, apron, hand gloves, nose mask and ear muffs if noise level exceeds 90dB. Helmet fitted with welding shield is preferred for welders, safety goggles
4	Stone/ concrete breakers	Ear muffs, safety goggles, hand gloves
5	Electrical Work	Rubber hand glove, Electrical Resistance shoes, Arc-flash resistant suit.
6	Insulation Work	Respiratory mask, Hand gloves, safety goggles
7	Grit/Sand blasting	Blast suit, blast helmet, respirator, leather gloves, safety goggles
8	Painting	Plastic gloves, Respirators (particularly for Spray painting)
9	Radiography	As per BARC guidelines
10	General	Helmets, Safety Shoes Reflective vests, ear plugs, nose masks, safety goggles

4. The exact PPEs required for a particular task shall be chosen to ensure there are multiple lines of defense against accident or injury. All applicable safety precautions for a job shall be ensured notwithstanding the duration or perceived importance of the task.
5. Additionally, the BHEL safety officer may demand additional PPEs based on specific requirement
6. The applicability of PPEs shall be as per the concept of Hierarchy of controls, i.e.: Elimination->Substitution->EngineeringControls->AdministrativeControls-PPEs
7. Relying solely on PPEs without other applicable controls to be strictly avoided.
8. The issuing agency shall maintain register for issue and receipt of PPEs (Format No. HSEP: 14-F06A). All the PPEs shall be checked for quality before issue and the shall be periodically re-checked. The users shall be advised to check the PPEs themselves for any defect before putting on. The defective ones shall be replaced.
9. The body harnesses shall be serial numbered.
10. All worker should wear reflecting Jacket during both shift Day/Night.
11. Where workers are employed in sewers and manholes, which are in use, the subcontractor shall ensure that the manhole covers are opened and ventilated at least for an hour before the workers are allowed to get into manhole, and the manholes so opened shall be cordoned off with suitable railing and provided with warning signals or boards to prevent incident to the public
12. Besides the PPEs mentioned above, the persons shall use helmet, safety shoe and reflective vest at all times. The visitors shall use Helmet and any other PPEs as

deemed appropriate for the area of work.

13. Following color scheme for Helmets to be maintained:
    a. Workmen: Yellow
    b. Safety staff: Green or white with green band
    c. Electrician: Red
    d. Others including visitors: White
14. The Helmets shall have logo or name (abbreviation of agency name permitted) affixed or printed on the front along with the person's gate pass no. & blood group. An awarded worker shall have reflective logo

8.4 ARRANGEMENT OF INFRASTRUCTURE

The subcontractor is responsible for ensuring and maintaining the required HSE infrastructure at site as described in this Section

8.4.1 DRINKING WATER

1. Drinking Water Storage Tanks shall be provided and maintained at suitable places at different elevations / locations to ensure easy accessibility. The tank/container shall be kept on a platform at an elevation of at least 2 feet and should be covered:



2. **Construction and Quantity:** The design of Drinking Water Storage Tank (DWST) shall be submitted to BHEL for approval prior to initiating construction. Provision of 5 liter water daily for each worker to be maintained.
3. **Labelling:** DWST should be labeled as "Drinking Water". Date of last cleaning, next due date shall be indicated on the container besides Date of source testing as per IS 10500.
4. Cleaning of the DWST shall be ensured at least once in a week. Mild cleaning detergents as used for cleaning vessels shall be applied and scrubbers (3M or equivalent) shall be used for removing scales and deposits on the inside surface. The tank shall be thoroughly cleaned with potable water only before it is refilled.
5. Suitability of the water source should be tested as per IS10500.
6. For all tanks containing water unsuitable for drinking, prominent "Do Not Drink" signage shall be pasted in English, Hindi and local language.
7. In Hot Work and other critical areas, drinking water shall be made available near the activity
8. Provision of supplying drinking water to height workers and those working in difficult to reach

areas shall be made available through dedicated personnel.

8.4.2 **PROVISION OF LATRINES AND URINALS AT SITE** (Ref: Interstate Migrant Workmen (Regulation & Employment and Act, 1979) read with The Inter-State Migrant Workmen (Regulation of employment and conditions of service) central rules, 1980 (PI refer rule no. 42)

LATRINES

1. Latrines shall be provided in every establishment on the following scale, namely: -

   a. Where females are employed, there shall be at least one latrine for every 25 females;
   b. Where males are employed, there shall be at least one latrine for every 25 males:

   Provided that where the number of males or females exceeds 190, it shall be sufficient if there is one latrine for 25 males or females, as the case may be, up to the first 100, and one for every 30 thereafter

2. Every latrine shall be under cover and so partitioned off as to secure privacy, and shall have a proper door and fastenings.
3. Where workers of both sexes are employed there shall be displayed outside each block of latrine and urinal a notice in the language understood by the majority of the workers **'For Men Only'**, or **For Women Ónly**', as the case may be.
4. The notice shall also bear the figure of a man or of a woman, as the case may be.

URINALS

5. There shall be at least one urinal for male workers up to fifty and one for female up to fifty employed at a time:
6. Provided that where the number of male or female workmen, as the case may be, exceeds 500 it shall be sufficient if there is one urinal for every fifty females up to the first 500 and one for every 100 or part thereof thereafter.
7. The urinals shall be designed and located so as to ensure privacy.
8. In case a structure encompasses multiple floors, urinals shall be provided suitably for quick access
9. The latrines and urinals shall be conveniently situated and accessible to workers at all times at the establishment.
10. The latrines and urinals shall be adequately lighted and shall be maintained in a clean and sanitary condition at all times.
11. Latrines and urinals other than those connected with a flush sewage system shall comply with the requirements of the public health authorities.
12. Water shall be provided by the means of tap or otherwise so as to be conveniently accessible in or near the latrines and urinals.

8.4.3 WASHING FACILITIES

1. In every workplace, adequate and suitable facilities for washing shall be provided and maintained.
2. Separate and adequate cleaning facilities shall be provided for the use of male and female workers. Such facilities shall be conveniently accessible and shall be kept in clean and hygienic

condition and dully illuminated for night use.

3. Overalls shall be supplied by the subcontractor to the workmen and adequate facilities shall be provided to enable the painters and other workers to wash during the cessation of work.

8.4.4 PROVISION OF REST SHELTER FOR WOKERS

Proper Sheds & Shelters big enough to accommodate all possible workers shall be provided for workers to rest during break. Taking rest at height, in activity area and other hazardous locations shall not be allowed.

The drawing of such sheds shall be submitted to BHEL for approval before construction.

8.4.5 MEDICAL FACILITIES

Refer Section B for applicability of requirements pertaining to Clause 8.4.5.1

8.4.5.1 MEDICAL CUM FIRST-AID CENTER

a) A medical center shall be setup at site with basic facilities for handling medical emergencies. The medical center shall be developed independently by BHEL/an agency as specified in the contract and run jointly by all agencies on proportionate sharing basis as stipulated in the contract.
b) A qualified medical professional, not less than MBBS, shall be deployed at medical center as stipulated in the contract.(Part-time or full time as decided at the site).
c) There shall be a full-time trained first aider and a nurse. Depending upon the working hours at the site, First-aider shall be deployed accordingly.
d) The center shall have all articles as per Schedule IV of BOCW(Central) Rules'1998. In addition,, one Stokes basket stretcher shall be available.
e) An ambulance shall be deployed for every 1000 persons along with trained driver and accessories as per schedule V of Central BOCW Rules'1998. Depending upon the working hours at the site, First-aider shall be deployed accordingly.
f) The center shall be adequately equipped for Resuscitation, Immobilisation, Dressing, dealing with poisoning cases including snake and insect-bites and sufficient stock of emergency medicines as prescribed by the qualified medical professional as per point (b)

8.4.5.2 IMPORTANT

g) If there is no specific mention of responsibility of deployment or setting up of any of the above facilities and operating expenses thereof, BHEL site management shall have the liberty to give this responsibility to any of the contractors on cost sharing basis.
h) Medical waste shall be disposed as per prevailing legislation (Bio-Medical Waste –Management and Handling Rules, 1998)
i) Every injury shall be treated, recorded and reported.
j) All First Aid injuries shall be recorded as per Format No. HSEP:14-F17
k) List of qualified first aiders and their contact numbers to be displayed at conspicuous places.

8.4.5.3 FIRST AID

A. In addition to 8.4.5.1 &2, The subcontractor with Boiler&ESP, TG, Civil shall:

1. Provide necessary first aid facilities for every work place.
2. Ensure availability of qualified First-aider throughout the working hours.
3. Every injury shall be treated, recorded and reported.
4. Refresher course on first aid shall be conducted as necessary.
5. List of qualified first aiders and their contact numbers to be displayed at conspicuous places.
6. All First Aid injuries shall be recorded as per Format No. HSEP:14-F17

B. FIRST AID BOX

1. The first aid box shall be maintained by first aider who shall always be readily available during the working hours of the work place.
2. **Details of First Aid Box:**
   a) Details of contents of first aid box is given in **Annexure 03.** A slip of contents shall be pasted on the First Aid Box with following details:

      Name, Quantity, Expiry Date, Checked by…
   b) First Aider's name and contact no to be displayed on the box.
   c) The first aid box shall be distinctly marked with a Green Cross on white background.
   d) The box shall be properly secured with lock & key to avoid misuse
7. The first aid boxes should be placed at various locations so as to make them available within easy reach of hazardous activities and at the quickest possible time.
8. The subcontractor shall ensure that the Supervisors and Engineers are adequately trained for attending to any emergency.
9. Monthly inspection of First Aid Box to be conducted by the subcontractor as per Format no. HSEP:14-F01

8.4.5.4 HEALTH CHECK UP

The persons engaged at the site shall undergo health checkup as per the **Format no. HSEP:14-F02** before induction. The persons engaged in the following works shall additionally undergo regular health checkup using same Format at least once in a year:

Height workers	Drivers/crane operators/riggers	Confined space workers
Shot/sand blaster	Welding and NDE personnel	Any person referred by BHEL

8.4.5.4.1 HEIGHT PHOBIA TEST

1. The persons engaged in working at heights (above 2 meters) to be assessed for Height Phobia and associated conditions.
2. Such workers are to be allowed only on successful completion of this test, otherwise they shall be allocated ground based jobs. IDs / Height passes shall be issued to such workers.

8.4.6 PROVISION OF CANTEEN FACILITY

Minimum or better facilities to be ensured as per BOCW (Rule 244) / Factories Act, specially taking care of the following:

1. Canteen facilities shall be provided for the workmen of the subcontractor inside the project site.
2. Proper cleaning and hygienic condition shall be maintained.
3. Proper care should be taken to prevent biological contamination.
4. Adequate drinking water should be available at canteen.
5. Fire extinguisher shall be provided inside canteen.
6. Regular health check-up and medication to the canteen workers shall be ensured.
7. Canteen waste to be disposed of in compliance with law
8. Domestic LPG cylinder shall not be used
9. Canteen should be periodically inspected using standard checklist finalized along with BHEL

8.4.7 PROVISION OF ACCOMMODATION / LABOR COLONY

1. The subcontractor shall provide to every workman (within fifteen days of the commencement of the employment of migrant workmen):

a) In case he is accompanied by any other member of his family, a suitable barrack so as to accommodate one room having at least a floor area of 10 square meters, a verandah and adequate additional covered space for cooking food as well as one common sanitary latrine, one common bathroom for every three such quarters; and

b) In case he is unaccompanied by any other member of his family, a suitable barrack so as to accommodate not more than ten such migrant workmen, having at least a floor area of not less than 6.5 square meters for each such migrant workman making use of the barrack, a verandah and adequate additional covered space for cooking food as well as one common sanitary latrine and one common bathroom for every ten such migrant workmen

2. Every quarter and the barrack shall be so constructed as to afford adequate ventilation, protection against heat, wind, rain and shall have smooth, hard and impervious floor surface.
3. The quarters or the barracks, as the case may be, shall be at a convenient distance from the establishment and shall have adequate supply of wholesome drinking water.
4. The area in which the quarters and/or barracks are located as well as the latrines and bathrooms provided therein shall be kept in a clean and sanitary condition at all times.
5. Regular housekeeping of the labor colony shall be ensured.
6. Availability of Bathing/ washing bay to be ensured

7. Room ventilation and safe electrification to be ensured
8. MSDS of LPG shall be put up prominently and shall be included in the induction training also.
9. The labor colony shall be secure so that only authorized persons have access to it.
10. Availability of local market to be ensured by the Sub-contractor
11. A "Suggestion Register" shall be made available at the labor colony for workers. The feedback shall be reviewed on weekly basis and acted upon.
12. Labor colony shall be inspected fortnightly by Subcontractor Safety Officer & HR executive, and report submitted to BHEL as per Format No. HSEP:4-F16
13. **Facility of Crèches –** to be provided wherein more than fifty female workers are deployed
14. Provisions of Clause 8.4.1, 8.4.2 and 8.4.3 shall be applicable on labor colony as well

8.4.8 PROVISION OF EMERGENCY VEHICLE

Dedicated emergency vehicle shall be made available at workplace by subcontractor for evacuation of victim from site.
However, Ambulance shall be used exclusively for transporting victim to hospital

8.4.9 PEST CONTROL

Regular pest control should be carried out at all offices, mainly laboratories, canteen, labor colony and stores by the subcontractor.

8.4.10 SCRAPYARD

1. Scrapyard shall be developed by subcontractor to store metal scrap, wooden scrap, waste, hazardous waste.
2. Scrap/Waste shall be segregated as Bio-degradable and non-bio-degradable and stored separately.

8.4.11 ILLUMINATION

1. The subcontractor shall provide adequate lighting facilities e.g. flood lighting, hand lamps, area lights etc. to ensure adequate lighting at all work places & their approaches including passage ways as per IS: 3646 (Part-II) at all times. Indicative recommended values are given below:

S. No.	Location	Lux Level
A.	**Construction Site**	
1	Outdoor areas like store yards, entrance and exit roads	**20**
2	Platforms	**50**
3	Entrances, corridors and stairs	**100**
4	General illumination of work area	**150**
5	Rough work like fabrication, assembly of major items	**150**

6	Medium work like assembly of small machined parts	**300**
7	Fine work like precision assembly, precision measurements etc.	**700**
8	Sheet metal works	**200**
9	Electrical and instrument labs	**450**
B.	**Office**	
1	Outdoor area like entrance and exit roads	**20**
2	Entrance halls	**150**
3	Corridors and lift cars	**70**
4	Lift landing	**150**
5	Stairs	**100**
6	Office rooms, conference rooms, library reading tables	**300**
7	Drawing table	**450**
8	Manual telephone exchange	**200**

In case any area is not mentioned above, the applicable illumination for the same shall be specified by BHEL based on applicable standards and international norms

1. Level of illumination shall be checked periodically using a calibrated lux meter and recorded for each work area on minimum weekly basis as per Format No. HSEP:14-F21
2. Lamp (hand held) shall not be powered by mains supply but either by 24V or dry cells.
3. Lamps shall be protected by suitable guards where necessary to prevent danger, in case of breakage of lamp.
4. Emergency lighting provision for night work shall be made to minimize danger in case of main supply failure.

9. HSE TRAINING & AWARENESS

9.1 HSE INDUCTION TRAINING

1. All persons entering into project site shall be given HSE induction training before being assigned to work, which shall be imparted through audio-visual medium and shall be of minimum 2-hour duration.

2. Any single trainee batch size should not exceed 40.

3. Proper safety wear & gear must be issued to all the workers being registered for the induction (i.e., Shoes/Helmets/Goggles/Leg guard/Apron etc.)

i. They must arrive fully dressed in safety wear & gear to attend the induction.
ii. Any one failing to conform to this safety wear& gear requirement shall not qualify to attend.

4. In-house induction training subjects shall include but not limited to:

i. Briefing of the Project details and importance of employee for the project and for the nation.
ii. Safety related cardinal rules, objectives and targets.
iii. Site HSE rules.
iv. Site HSE hazards and aspects.
v. First aid facility.
vi. Emergency Contact No. and procedures
vii. Details of Fire prevention and emergency response systems & procedures at site.
viii. Requirement of incident / near miss reporting by all.
ix. Accident case studies
x. Rules to be followed in the labor colony (if applicable)

5. Evaluation to be carried out after training and induction training to be repeated in case of failure of participant in evaluation

6. On completing subcontractor's in-house HSE induction, each employee shall sign an induction training form (format no. HSEP: 14-F03) to declare that he had understood the content and shall abide to follow and comply with safe work practices. They may only then be qualified to be issued with a personal I.D. card, for access to the work site (provided Health Checkup is over).

9.2 HSE TOOLBOX TALK

1. HSE Tool Box talk shall be conducted by frontline foreman/supervisor of subcontractor to specific work groups daily prior to the start of work. The agenda shall consist of the following:

   i. Visual checkup of workers regarding health, any signs of fatigue, intoxication etc.
   ii. Details of the job being intended for immediate execution.
   iii. The relevant hazards and risks involved in executing the job and their control measures.
   iv. Specific site condition to be considered while executing the job like high temperature, humidity, unfavorable weather etc.
   v. Recent non-compliances observed.
   vi. Appreciation of good work and warning for any unsafe acts done by any person.
   vii. Any doubt clearing session at the end

2. Record of Tool box talk shall be maintained as per Format no. HSEP:14-F04

9.3 TRAINING ON HEIGHT WORK

Due to the large percentage of fall from height in incidents, training of minimum 2-hour duration on height work shall be imparted to all height workers by in- house / external faculty for every batch of new inductees. The training shall include following topics:

1. Inspection of work area, access and egress w.r.t height hazards
2. Use of PPEs; use of fall arrester, retractable fall arrester, life line, safety nets etc.
3. Safe climbing through monkey ladders.
4. Inspection of PPEs.
5. Medical fitness requirements.
6. Mock drill on rescue at height.
7. Dos & Don'ts during height work.

8. Accident case studies

In case, above is organized by BHEL, proportionate cost shall be borne by subcontractors

9.4 HSE TRAINING DURING PROJECT EXECUTION

1. HSE training shall be arranged by subcontractor as per the need of the project execution and recommendation of BHEL.
2. The topics of the HSE training shall be as follows but not limited to:

i. Hazards identification and risk analysis & Identification of Environmental Aspects / Impacts
ii. Work Permit System
iii. Learning from past incidents
iv. First aid, Firefighting & Fire-warden training
v. EMS and OHSMS
vi. T & Ps fitness and operation
vii. Electrical & Chemical safety
viii. Welding, NDE & Radiological safety
ix. Material handling.

3. Safety awareness and on-the-job training programmes shall be carried out at site for all workers periodically. Periodicity to be decided by BHEL but shall be minimum once in six months
4. Penalty Training – In case of any incident, the involved person, group or agency shall undergo a penalty HSE training for a minimum period of 2 hrs or as decided by BHEL.
5. In case it is not possible to provide training to all workers at once, same shall be imparted in Batch-wise manner so as to cover all workers with specified periodicity.
6. An up-to-date record to be maintained with attendance of participants and trainers preferably in soft copy as per Format No. HSEP:14-F03.
7. Every employee of agency should be provided at least 2 hr. safety training in every month.

In case, above is organized by BHEL, proportionate cost shall be borne by subcontractors

10. HSE PROMOTION: SIGNAGE, POSTERS, COMPETITION, AWARDS ETC

10.1 DISPLAY OF HSE POSTERS AND BANNERS

Site shall arrange appropriate posters, banners, slogans in local/Hindi/English languages at work place.

10.2 DISPLAY OF HSE SIGNAGE

Appropriate HSE signage shall be displayed at the work area to enhance awareness of HSE workmen and passersby about the work going on and do’s and don’ts to be followed.

10.3 COMPETITIONS ON HSE, AWARDS & REWARDS

1. Subcontractor shall arrange competitions (slogan, poster, essay etc.) on HSE for workers and employees from time to time (Safety day, World Environment Day etc. minimum one such function each month) and winners will be suitably awarded during the functions.

2. Subcontractor shall identify workers following good HSE practices and reward them from time to time as encouragement to follow good HSE practices.

3. Alternatively, if a common monthly function is organized at site, subcontractor shall participate in the same so that a minimum frequency of one such function per month is maintained.

10.4 HSE AWARENESS PROGRAMMES

Subcontractor shall arrange HSE awareness programmes periodically on different topics including medical awareness for all personnel working at site from time to time including officials involved in execution.

11. HSE COMMUNICATION AND PARTICIPATION

11.1 MONTHLY HSE REPORTING

1. HSE activities shall be reported to BHEL monthly as per Format no. HSEP: 14-F05. The reporting medium can be hard/soft as per BHEL requirement.

2. The period of reporting shall be 25th of the preceding month to 24th of the present month and report shall be submitted by the end of the calendar month or as conveyed by BHEL.

3. BHEL can modify the reporting requirements as per requirement

11.2 HSE EVENT REPORTING

1. Important HSE events like HSE Training, Mock / Fire/Rescue Drills, Medical camp etc. organized by subcontractor shall be reported to BHEL in detail with photographs

2. Celebration of important days like National Safety Day, World Environment Day etc. shall also be reported likewise.

11.3 HSE INCIDENT REPORTING

All incidents (near misses, property damage, first-aid cases, minor, major and fatal incidents) shall be reported to BHEL as they happen through SMS and Hard/Soft copy as per Format No. HSEP: 14-F22

11.4 HSE SUGGESTIONS

All workers and employees to be encouraged to provide suggestions for improvement in

Health, Safety & Environment at site. The suggestions to be recorded in a "Suggestions Register". Suggestions to be reviewed and those having potential of significant beneficial effects are to be implemented, and recognition / award to be given to the individual.

11.5 CLIENT COMMUNICATON

All HSE related communication from BHEL, customer / external statutory and regulatory agencies to be handled on priority. The relevant issues to be resolved in expeditious manner

11.6 RECORDS OF COMMUNICATON

Records of all communication and their responses as detailed above shall be maintained by subcontractor in hard / soft copy and produced when required.

12. INCIDENT REPORTING, INVESTIGATION & CORRECTIVE ACTION

1. A conducive environment for reporting of near misses and other incidents shall be developed at site through system of rewards etc.
2. Priority to be given to ensure medical treatment of the victim. Victim to be given immediate First Aid and transported to Medical Facility in a well-equipped Ambulance
3. All incidents, as they happen, shall be reported to BHEL immediately over phone/SMS/Whatsapp/mail and then in Format No. HSEP:14-F22 within 24 hrs. of occurrence. Immediate SMS shall be sent to concerned Package In-charge with following Details:
    a. Project & Customer Name:
    b. Subcontractor Name & Scope:
    c. Incident Area:
    d. Number of Injured / Fatalities:
    e. Date & Time of Accident:
    f. Incident Description in few lines:

    No incident shall be hidden
4. Records of all incidents shall be maintained in hard / soft copy as per Format No. HSEP:14-F23.
5. For all incidents:
    a. The incident area, equipment / tools involved, documents & records etc. shall be maintained as-it-is pending investigation
    b. Root Cause Analysis (RCA) to be conducted and corresponding Corrective / Preventive Action (CAPA) ensured
    c. Responsibility shall be assigned and action to be taken against the erring individual
    d. In case presence of manufacturer of the equipment involved is required, subcontractor will arrange the same

e. All expenses pertaining to the RCA / CAPA shall be borne by the subcontractor

6. RCA and CAPA reports of all near misses and minor injuries shall be identified and report submitted to BHEL within 7 days of occurrence.
7. For incidents, where worker does not resume duty within 48 hours of occurrence, Joint investigation along with BHEL shall be conducted within 7 days, and CAPA ensured.
8. Corrective action shall be immediately implemented at the work place. Work shall be put on hold in the area till corrective actions are verified by BHEL
9. All incidents, their Root Cause Analyses and Corrective actions shall be recorded, and analyzed so as to identify weak areas and actions to be taken to reduce the incident trend.

13. SAFETY DURING WORK EXECUTION

13.1 HSE SYSTEMS AND PROCEDURES

BHEL Power Sector HSE Management System (HSEMS) shall be referred for controlling hazards, aspects, and carrying out HSE activities at site. Subcontractor shall get familiar with and follow the HSEMS documents provided by BHEL which include the follows:

13.1.1 HSE PROCEDURES:

All HSE Procedures defined in HSEMS, as referred in various sub-clauses of this Section as given in Annexure 01

13.1.2 PERMIT TO WORK (PTW) SYSTEM

1. The following activities shall be carried out by the subcontractor strictly after obtaining Permit to Work (PTW) from BHEL

   i. General Work Permit (**Format No. HSEP14-FP01)**
   ii. Height working (**Format No. HSEP14-FP02)**
   iii. Hot working (**Format No. HSEP14-FP03)**
   iv. Confined space Work (**Format No. HSEP14-FP04)**
   v. Excavation more than 2-meter depth (**Format No. HSEP14-FP05)**
   vi. Radiography / Radiation Work (**Format No. HSEP14-FP06)**
   vii. Heavy / Complex / Critical Lifting Activity (**Format No. HSEP14-FP07)**
   viii. Night / Holiday Work (**Format No. HSEP14-FP08)**
   ix. Material Loading / Unloading Permit (**Format No. HSEP14-FP09)**
   x. Grating / Safety Net / Safety Facility Removal Permit (**Format No. HSEP14-FP10)**
   xi. Live Electrical Maintenance etc. - Lockout / Tag (**Format No. HSEP14-FP07)**

2. The above list is not exhaustive. BHEL reserves right to introduce additional Permits or modify requirements for usage of existing Permits. The conditions for using the Permit are specified in the Format (General Requirements).

3. Where customer is having separate Work Permit System the same shall be followed in conjunction to ensure all activities and checks are covered in all systems.

4. Permit applicant shall apply for work permit of particular work activity at particular location before starting of the work along with Job Hazard Analysis.

5. All Permit signatories shall physically visit the work area and check that all the safety control measures necessary for the activity are in place. Only then the permit shall be issued.
   a. Signatory shall physically visit the area of work and ensure all required safeguards before signing the Permit
   b. Signatory shall periodically visit the area to confirm the availability of required safeguards throughout the currency of the permit
   c. In case any Permit requirement is not available, work will be stopped till it is made available

6. Permit holder shall implement and maintain all control measures during the period of permit. The permit will be closed after completion of the work and submitted to BHEL.

13.1.3 Operational Control Procedures

1. All applicable OCPs (Operational Control Procedures) as identified from outcomes of HIRA, Aspect / Impact studies and BHEL inputs will be followed by subcontractor. This will be done as part of normal scope of work.
2. Illustrative list of such OCPs is given in Table 13.1 and same will be made available to subcontractor by BHEL during work execution at site.
3. In case any other OCPs are required or existing ones need to be modified in order to control the risks / impacts associated with any activity during the execution of work subcontractor shall prepare / update and follow the same with information to BHEL.

Table 13.1 - LIST of Reference OCPs

No.	Topic	No.	Topic	No.	Topic
0	General Safety	22	Steam blowing	44	Material preservation
1	Handling of chemicals	23	Working in confined area	45	Electro-resistance heating
2	Electrical safety	24	Operation of passenger lift, material hoists & cages	46	Blasting
3	Energy conservation	25	Vehicle/ Crane maintenance	47	Transformer charging
4	Welding and gas cutting operation	26	Radiography	48	Handling of battery system
5	Fire safety	27	Waste disposal	49	DG set
6	Use of hand tools	28	Handling & storage of mineral wool	50	Sanitary maintenance
7	First aid	29	Working at night	51	Piling rig operation

8	Food safety at canteen	**30**	Computer operation	**52**	Passivation
9	Use of cranes	**31**	Storage in open yard	**53**	EDTA Cleaning
10	Storage and handling of gas cylinders	**32**	Drilling, reaming and grinding(machining)	**54**	Chemical cleaning of Pre boiler system
11	Manual arc welding	**33**	Stress relieving	**55**	Boiler Light up
12	Use of helmets	**34**	Hydraulic test	**56**	Rolling and Synchronization
13	Good house keeping	**35**	Trial run of rotary equipment	**57**	Loading of Unit
14	Safe excavation	**36**	Batching	**58**	Air compressor
15	Working at height	**37**	Cable laying/tray work	**59**	Hydra Operation
16	Filling of hydrogen in cylinder	**38**	Spray insulation	**60**	Duct/ Structure Preassembly
17	Illumination	**39**	Compressor operation	**61**	Resumption of construction activities after lockdown and prevention of coronavirus infection during site operation
18	Handling and erection of heavy metals	**40**	Gas distribution test	**61A**	Prevention of Covid-19 infection in labour colony
19	Acid cleaning	**41**	Cleaning of Hotwell / Deaerator	**62**	Truss/ Structure fit-up & alignment
20	Oil flushing	**42**	Electrical maintenance		
21	Alkali boil out	**43**	O&M of control of AC plant & system		

13.2 ACTIVITY SPECIFIC REQUIREMENTS FOR SAFETY:

All Work shall be commenced only after taking the respective Work Permits (as applicable) and precautions as per relevant codes, systems and OCPs in order to ensure safe conditions throughout the duration of work. Additionally, activity specific safeguards as per this section shall be followed.

13.2.1 WORK AT HEIGHT:

1. All work at height above 2 meter above ground level without complete platforms, handrails and other related fall protection shall require a work permit in the prescribed form. This shall require approval by the competent authority. The HSE officer of sub-contractors shall follow the checklist religiously by physically verifying the condition of the work area before recommending for approval.

2. Prior to the start of work at elevation, the HSE Officer involved with the work must meet the work supervisor to review the scope of work, and must review all the possible fall hazards and effective safety responses. The evaluation / analysis must be documented and kept on file and on site by the HSE Officer.

3. Whenever a fall hazard or other exposure exists for working at heights more than 2.0m/6ft, the nature and scope of work will be evaluated for conditions and environmental factors before selecting the appropriate fall protection system (active, passive or a combination of measures, as appropriate).

4. All Engineering and Administrative Controls including barricading, safe platform, Safety Nets etc. shall be made available at work location. Under no circumstances, there shall be total reliance on PPEs only

5. **Safety Nets**

   a. Contractor shall maintain sufficient stock of Safety Nets for deployment
   b. Safety Nets as per IS: 11057:1984 should be used extensively for prevention / arrest men and materials falling from height.
   c. The safety nets shall be fire resistant, duly tested and shall be of ISI marked.
   d. Safety Nets shall be deployed below all platforms where height work is envisaged. Duration of work, delay shall be no excuses for non-installation of Safety Net

6. Reaching beyond barricaded area without lifeline support, moving with support of bracings, walking on beams without support, jumping from one level to another, throwing objects and taking shortcut must be discouraged.
7. Monkey Ladder shall be fitted with cages. Rope ladder should be discouraged.
8. In case of pipe-rack, persons should not walk on pipes and walk on platforms only.
9. In case of roof work, walking ladder/ platform should be provided along with lifeline and/ or fall arrestor.
10. For chimney or structure painting, both hanging platform and men should be anchored separately to a firm structure along with separate fall arrestor.
11. The procedures for the safety response to identified fall hazards developed and rescue plans must be reviewed with all individuals exposed to the hazards.
12. The HSE Officer must establish an inspection process of fall protection systems. Some equipment requires documented inspections by its manufacture on a regular schedule. Such equipment must have evidence of the inspection and re-certification process on it. This information must be reviewed before the equipment is actually used. Individuals must visually inspect the fall protection equipment before each use. Failure to complete this inspection process could result in serious injury or death.
13. Immediately remove from service any fall protection equipment that is identified as defective, damaged, or has been subjected to an impact. Damaged fall protective equipment must be destroyed to prevent re-use and not be discarded into trash containers, as the worn or

damaged equipment could be unintentionally re-used.

14. Aerial lifting devices, excluding scissor lifts require the use of full body harnesses and lanyards in any elevated position.

13.2.1.1 Personnel fall protection system must include:

a. Safety Harness

All height workers must use Safety harness with double lanyards. The primary lanyard is never unhooked until the secondary lanyard is secure. The design of the working platform should be such that u**nder no circumstances, worker should have both lanyards unhooked while at height.**

b. Lanyard

i. The type of work and the environment conditions determine lanyard and lifeline selection. If welding, chemical cleaning that may damage lanyards, connectors or lifelines, sandblasting, etc., either protect the components or use more appropriate type of system.

ii. Lanyards and lifelines must incorporate, or be used with, an appropriate deceleration (shock absorbing) device. Deceleration devices include rope grabs, rip-stitch lanyards, specially woven lanyards, tearing, or deforming lanyards, automatic self-retracting lifelines and lanyards which dissipate or limit the energy imposed on the employee during fall arrest.

iii. Once in use, the system's effectiveness is to be monitored. In some cases, a program for cleaning and maintaining the system may be necessary. Lanyard and lifelines must use locking snap hooks only and under no circumstances must two lanyard snap hooks be connected.

c. Lifeline

All lifelines in general are to be made of min 8mm dia steel rope (plastic coated) and tied to columns with 3 clamps at each end. Wherever columns are not available to tie the lifelines, the vertical posts as per the design below are to be provided after carrying out drop load test initially. A load of 240kg to be dropped off the mid-point of lifeline in this test.

d. Lifeline Post

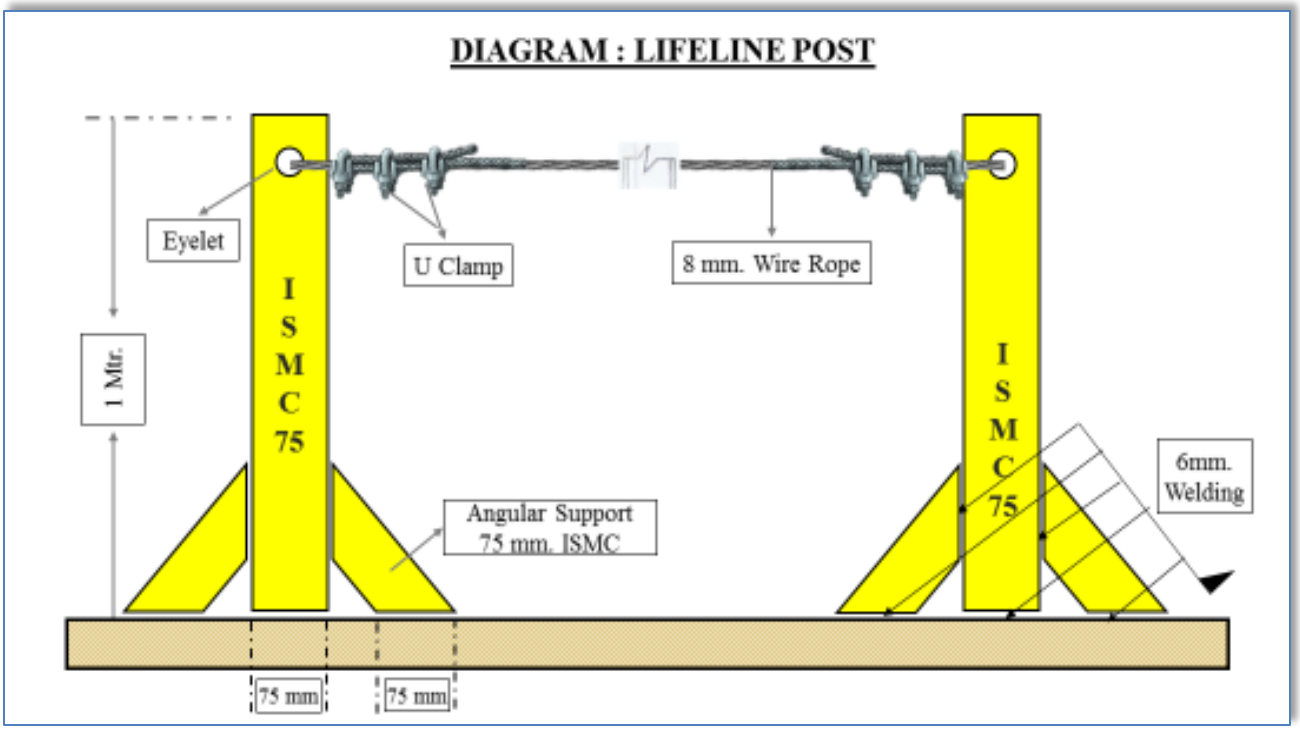


Fig. 13.2.1.1 Lifeline Post

i. The support at vertical post shall be fixed at end-to-end. The maximum length of one end to another end shall be 18 meters
ii. If the length of a lifeline is more than 18 meters, then intermediate vertical post(s) are to be used. Such intermediate post(s) will act as supports and the lifeline rope should simply pass through the eyelets (holes) of such supports without being anchored
iii. The lifeline need not be wrapped / clamped to any intermediate post
iv. Such intermediate posts must be used at an interval of every 18 meters
v. The post(s) in which the original lifeline is to be installed should be capable of sustaining a tensile stress of 2268 Kgs
vi. In a horizontal lifeline installation, maximum allowable sagging is 500-600 mm
vii. For a single spun lifeline, no more than 2 persons are allowed to work; for more than two workers, another lifeline should be installed
viii. Horizontal lifeline should be so installed that it does not impede safe movement of workers
ix. All the installation work must be carried out by competent person with adequate knowledge

13.2.1.2 Working Platform

1. Working platforms, gangways and stairways shall be so constructed that they do not sag unduly or unequally and if the height of the platform gangways provided is more than 3.6 m above ground level or floor level, they shall be closely boarded and shall have adequate width, which shall not be less than 750 mm and be suitably fenced.

2. Precautions against the fall of Materials, Persons and Collapse of Structures

i. Every opening in the floor or a building or in a working platform shall be suitably barricaded to prevent the fall of persons by providing suitable fencing or railing whose minimum height shall be 90 cm.
ii. Adequate precautions should be taken such as the provision of fencing, or barriers to protect any person who might be injured by the fall of materials, or tools or equipment being raised or lowered. Cradle may be used for lifting materials - however this shall be made of MS angles and flats only and duly certified by the HSE officer. Operators may also use designed containers for lifting small tools.
iii. Guardrails (including scaffolding) erected over/adjacent working areas must have the guardrails screened (opening < 0.5), to prevent material from falling outside the platform/decking.
iv. Guardrails must be able to withstand a 200-pound force exerted in any one direction.
v. Where necessary to prevent danger, guys, stays or supports should be used or other effective precautions should be taken to prevent the collapse of structures or parts of structures that are being erected, maintained, repaired, dismantled or demolished.
vi. All openings through which workers are liable to fall should be kept effectively covered or fenced and indicated in the most appropriate manner.
vii. Guardrails and toe-board/barricades and sound platform conforming to IS: 4912-1978 and

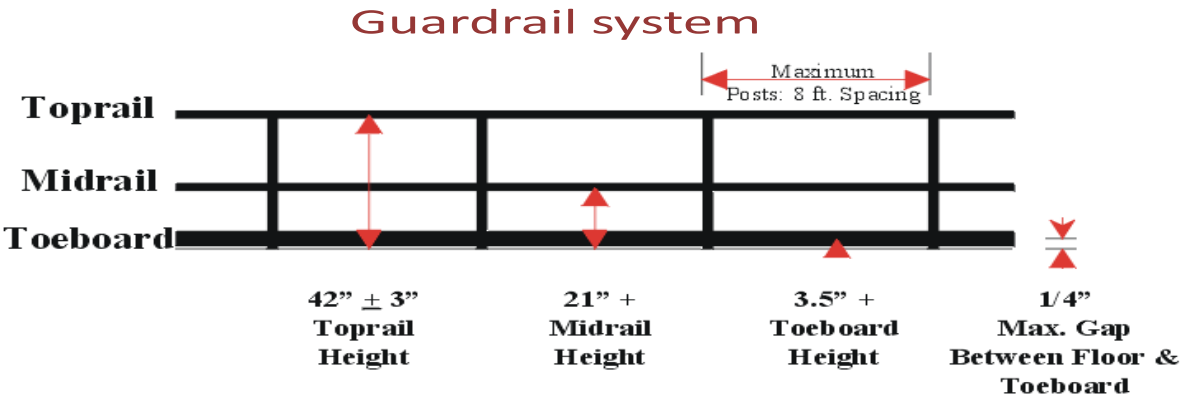


Fig. 13.2.1.2 Guard Rail System

viii. Guardrails shall be provided to protect workers from falling from elevated work places. The rails are generally made of MS pipes of suitable dia. Rebar shall not be used for any handrails, ladder or cover purpose. Wherever the guard-rails and toe-boards cannot be provided:
   a. adequate safety nets or safety sheets shall be erected and maintained; or
   b. adequate safety harnesses shall be provided and used and / or
   c. adequate fall arrestor shall be provided and used.

   As mentioned under PPE clause, all these PPEs shall be defect free and regularly inspected for any defect. The full body safety harness shall have double lanyard only with max 1.8m length.
ix. The monkey ladders shall have sufficient fall arrestors. Adequate lifelines of 8mm steel wire

rope shall be provided across the work area.

x. The HSE officer shall recommend appropriate PPEs after analyzing hazards and risks involved.

13.2.1.3 Scaffolding

All scaffolds shall be conformant to the relevant standards including IS 3696 and IS 4014 as applicable. A sketch of the scaffolds proposed to be used shall be prepared and approval of the BHEL Engineer obtained prior to construction / use.

General

1. The scaffolding work must be carried out by a competent person, who shall train the scaffold users on safety aspects
2. All scaffolds shall be erected / dismantled by scaffolding crew under direct supervision of competent scaffolding supervisors.
3. All scaffolds shall be capable of supporting 4 times maximum intended load and erected on sound, rigid footing, capable of carrying the maximum intended load without settling or displacement. Bamboo scaffolding is not permitted for use on site.
4. Each employee on the scaffold shall use an approved safety harness attached to an independent lifeline. The lifeline is to be securely attached to substantial members of the structure (not the scaffold itself) or to securely rigged lines, which shall safely suspend a worker in event of a fall.
5. Guard rails and toe boards shall be installed on all open sides and ends of platforms more than (2) meters above ground or floor
6. Scaffold planks must be at least 5 cm x 25 cm (2” x 10”) full thickness lumber scaffold grade or better.
7. Scaffold planks shall not span distances greater than 2.5 meters (8 feet).
8. Scaffold planks shall extend over end supports not less than 6 inches nor more than 12 inches and be secured to the scaffold. Scaffolding and accessories with defective parts shall be immediately repaired or replaced.
9. All scaffolding must be a minimum of two planks wide. No one may work from a single plank.
10. Scaffold planks must be inspected before use. Planks that have been damaged must be removed from the site.
11. Access ladders must be provided for each scaffold. Climbing the end frames is prohibited unless the design incorporates an approved ladder.
12. Adequate mudsills or other rigid footing capable of withstanding the maximum intended load must be provided.
13. Scaffolds more the 6 meters (20 feet) in height must be tied to the building or structure at intervals which do not exceed 4 meters (13 feet) vertically and 6 meters (20 feet) horizontally.
14. Do not overload scaffolds. Material should be brought up as needed. Scaffolding must not be loaded in excess of its rated capacity.
15. Barrels, boxes, kegs, blocks or similar unstable object must never be used as work platforms or to support scaffold.
16. Where persons must work under or pass under a scaffold then a 18 gauge wire mesh screen must be installed between the toe board and guard rail.
17. Employees exposed to overhead hazards while working on a scaffold will be protected by 5 cm (2”) thick planks.
18. Wooden/bamboo ladders shall not be allowed at any cost. Ladder’s rungs shall be fitted /welded properly. Before every use the rungs should be checked for safe use.

19. Wooden scaffolds shall not be used in areas where fire / fire products are expected
20. Ropes made of jute / Plastic and other fire prone material shall not be used to tie up scaffolding components together
21. The platform should have permanent hand rail and mid rail with Toe board without fail.
22. All platforms are to be tightly planked for the full width of the scaffold, except as may be necessary for entrance openings. Platforms shall be secured in place.
23. On suspension scaffolds designed for a working load of 500 pounds, no more than two workers are permitted to work on the scaffold simultaneously. On suspension scaffolds with a working load of 750 pounds, no more than three workers are permitted on the scaffold simultaneously.

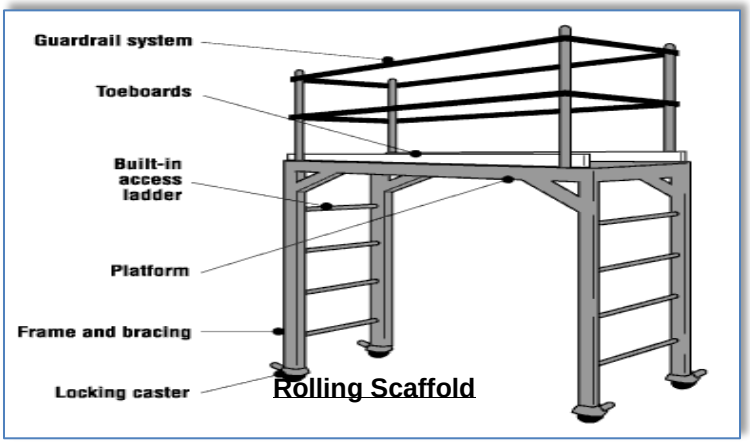
24. Requirements for different types of Scaffolds:

A. Suspended Scaffold

i. Suspended scaffolds are platforms suspended by ropes, or other non-rigid means, from an overhead structure.
ii. Requirements for use are to be preapproved by HSE Head, under a specific Permit to Work.

B. Rolling Scaffolds

i. The height of rolling scaffolds shall not exceed three times the minimum base dimension.
ii. The minimum base dimension of rolling scaffold will be 1.25 meters (4 feet).
iii. Adequate help must be provided when moving a rolling scaffold.
iv. Secure or remove all loose materials, equipment and tools before moving a rolling scaffold.
v. No one is permitted to ride a rolling scaffold when it is being moved. Castor brakes must be locked-on when the scaffold is not being moved.



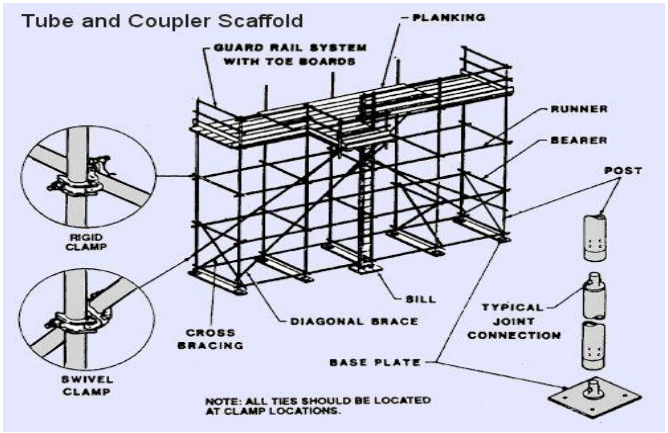


Fig. 13.2.1.3 Types of Scaffolds

25. Scaffold Tagging

Scaffolds being erected, modified or dismantled must be tagged as suitable for use. The scaffolds can only be accessed by those involved with the process.

GREEN scaffold tag- shall be fixed when scaffold is complete and safe for use, signed and dated by

the scaffolding competent person daily.

RED scaffold tag – to be fixed if scaffold is in some way defective and cannot be used or is still under erection.

Examples of scaffold tags:



Fig. 13.2.1.4 Scaffold Tagging

13.2.1.4 Ladder Safety

A sketch of the ladders proposed to be used shall be prepared and approval of the BHEL Engineer obtained prior to construction / use

Safe Use of Ladders:

1. Fall protection is required when working on a ladder above 2 meters and when climbing above nearby guardrails.
2. Ladders must be inspected prior to use and by a competent person quarterly, with documentation.
3. Use portable ladders for height up to 4 M only
4. Provide fixed ladders for height above 4 M
5. Place the ladder at an angle of 75 degrees (approx.) from the horizontal (1:4)
6. Extend ladder at least 1 M above the top landing
7. Secure top and bottom of the ladder firmly to prevent displacement- anti skid lining at the bottom
8. Ensure that the width of the ladder is not less than 300 mm and distance between rungs is not more than 300 mm
9. Provide landings of minimum size 600 x 600 mm at intervals not more than 6 M for fixed ladders. Check the ladders daily for any defects
10. Ensure that the areas around base and top of the ladder are clear. Getting on and off the ladder is more hazardous than using it. Use a mudsill if the ladder is to rest on soft, lose or rough soil
11. Do not use ladders of conducting material near power lines, and only use ladders near power line or other energize system with exposed parts if they are confirmed locked-out and de-

energized.

12. Stand no higher than the fourth rung from the top for carrying out any job standing on a ladder.
13. Never reach out from a ladder to perform work where your belt buckle protrudes past the ladder rung.
14. Always face the ladder while climbing up or down
15. Maintain three-point contact while climbing up or down a ladder i.e. two hands and one foot or two feet and one hand on the ladder at all the times.
16. Avoid climbing up or down a ladder while carrying anything in hands. Lift tools, equipment and materials with a rope.
17. Work from portable and extension ladders near guardrail where fall expose exists over the guardrail regardless of height, and above 2.0 mtr. heights from the working/walking surface will require the use of personal fall arrest equipment

13.2.2 EXCAVATION & CIVIL WORKS

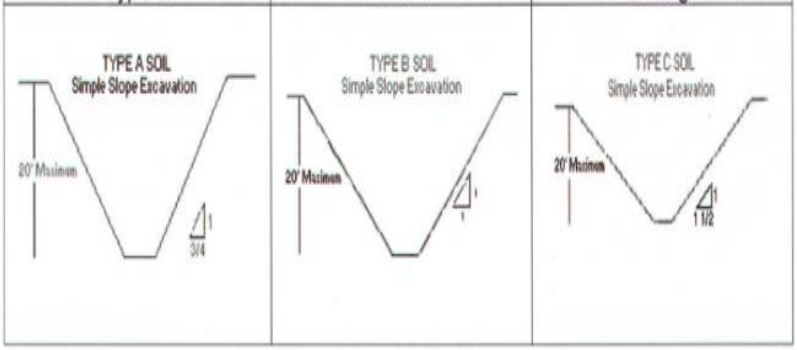
All safety precautions shall be taken for foundation and other excavation marks as per IS-3764.

13.2.2.1 Excavation

The following safety measures are to be ensured before and during excavation:

1. All Excavation activities more than with depth of 1.22 meter or more shall require and Excavation Work Permit
2. Check for underground utilities like electrical / telephone cables, sewage, water lines and proper care has to be exercised to protect and prevent damage to it
3. Proper and adequate slope is maintained while excavating
4. Adequate shoring or sheeting is done wherever require to prevent soil sliding
5. Safe access through ladder or steps for exit & entry to excavation
6. No material /excavated soil is kept within one meter from the edge
7. Safe way is planned and provided for movement of HEM /transport equipment near excavation
8. Safety helmet and shoes/gum boots are provided and worn by the workmen at excavation works
9. Dewatering arrangement is made where water seepage is prevailed.
10. Stop blocks are provided to avoid vehicles reversing into the excavated trenches
11. Danger signs /Caution boards are displayed at work spot
12. Barricading is provided at excavated pits

Soil Type	Height/Depth ratio	Slope Angle
Stable Rock	Vertical	90 deg.
Type A	¾ : 1	53 deg.
Type B	1 : 1	45 deg.
Type C	1½ : 1	34 deg.



Determining Soil Type

Type	Description	Examples
A	Cohesive soils with an unconfined compressive strength of 1.5 tons per square foot or greater.	Clay, silty clay, sandy clay, clay loam and in some cases: silty clay loam and sandy clay loam.
B	Cohesive soils with unconfined compressive strength greater than 0.5 tsf but less than 1.5 tsf.	Angular gravel (similar to crushed rock), silt, silt loam, sandy loam and, in some cases silty clay loam and sandy clay loam.
C	Cohesive soils with unconfined compressive strength greater than 0.5 tsf or less.	Granular soils such as gravel, sand and loamy sand; submerged soil or soil from which water is freely seeping; submerged rock that is not stable.

Fig. 13.2.2.1 Excavation Reference

13.2.2.2 Piling

Ensure the following precautionary measures before starting piling works:

1. Inspection of piling equipment by responsible person for its condition before initiating piling operation.
2. Checklist and OCP for piling to be prepared using manufacturer's instructions and used
3. Testing and its certification wire ropes, slings, D-shackles, chain pulley blocks using in the process of piling work by competent person
4. Adequate support and secured foundation of the piling equipment to avoid toppling
5. Hoses should be lashed and adequately secured
6. Proper work platform is to be provided on piling frame
7. Safe work procedures and close supervision to prevent unsafe acts of operators/any unsafe conditions that may arise
8. Only experienced and trained operators are engaged for the piling operation
9. Provision of Personal Protective Equipment (PPE) like safety shoes/gumshoes/safety helmet/safety belt etc. and its use by their workmen.
10. Special care and precautions If work is near electrical live cables/ electrical equipment
11. Cordoning of work area to prevent un authorized entry
12. Guarding of revolving parts
13. Specific measures to prevent over turning of pile driver/missing of hammer/ hammer movement out of range

13.2.2.3 Batching

Following Safety considerations for batching plant are to be ensured:

1. Modern type batching plant should be used in which all the moving parts are protected and

emergency and safety features are incorporated.

2. Installation of external Electric moto-vibrators in the feeding hopper of all batching plants to reduce human intervention.
3. Installation of safety devices like pull-chord on both the sides of conveyor for stopping the conveyor in emergency
4. Workers carrying cement / sand to be given appropriate PPEs like respiratory masks & gloves.
5. Conveyor belt/rotating parts must be guarded properly.
6. Safety awareness shall be inculcated in workmen about the risk involved in rotating parts.
7. The agency shall ensure to erect the batching plant as per drawing including installation of all safety devices as provided by manufacturer and witnessed by BHEL Engineer in charge before starting of machine in future.
8. Safety audit to also focus on Batching plant.
9. The site shall impose penalty on the agency who has violated the safety norms as per contract.

13.2.2.4 Mobile Plant

Mobile plant includes tractors, trailers, dumpers, excavators, bulldozers, road rollers etc. for earthmoving purpose and concrete mixers, concrete transit mixtures, concrete pumps etc for concreting purpose. Due to the very nature of their function and movement in difficult terrains, congested areas, working in tandem with manual work and other operations the danger is inherent. Reverse horn is compulsory for all earth moving machineries.

Following Safety measures to be ensured for Mobile Plant:

1. Where movement around site is involved, routes should be planned, obstruction free and well maintained
2. Observe specified speed limits
3. Operating personnel should be aware of associated risks and its preventive measures
4. Only experienced, trained and authorized persons with valid license (wherever applicable) should operate the mobile equipment/vehicles
5. Provide and use Warning lights and reverse horn for cautioning the people around
6. Operation should be on level and stable ground with adequate working clearance.
7. Loading of out riggers/stabilizers should be well within safe ground bearing capacity
8. No person should be on equipment or vehicle during loading and unloading of material
9. Operators should be protected by warning barriers or switching off power when working in close proximity of overhead power lines
10. The equipment /vehicles should be well maintained and provided with effective brake system and other safety devices (wherever require)
11. Rotating parts of equipment should be adequately guarded
12. Provide necessary personal protective appliances and ensure its use by the operating personnel Ensure effective measures at source to control harmful emissions, dust, fumes contaminating atmosphere and cause health hazards to the operators and people in the vicinity.
13. No overloading/over stressing of vehicles/plant is allowed
14. Hoses, pipes, receivers, gauges and valves involved in carrying out hydraulic fluid/ compressed air should be checked for leaks and tested prior to operation.
15. Adequate safe clearance for swing and movement is to be judged during operation of Concrete mixer

16. Setting of machine on firm and level ground with wheel locked to prevent movement of machine
17. Proper instructions and Special precautions are to be ensured to prevent entry in to the danger zone of projectile of bucket while dropping bucket
18. Operator leaving work spot should ensure that the equipment/vehicle is kept in neutral position and place on firm and level ground.
19. The hand brake should be kept in position and block road wheels as additional safety measure
20. Blades/buckets should be kept low while moving
21. The dozer blades should not be used as brakes except in emergency
22. The ground should be examined for its bearing capacity and general safety especially when operating road roller at the edges of slopes, embankments.
23. The roller should not be moved downhill with the engine out of gear
24. If operating near excavations the following precautionary measures are to be ensured
25. Barricading, edge protection to prevent fall of persons/vehicles over running while reversing etc.
26. Suitable support system and adequate allowance to avoid the danger of side collapsing
27. Experienced signaler /attendant should be always accompanied with operator/driver for proper direction /signal and also to caution others in the working Zone during operation of mobile plant

13.2.2.5 Concrete Vibrators

1. Revolving parts/belt drives should be adequately guarded and Vibrating unit shall be completely enclosed and have suitable overload relays and effectively earthed
2. Ensure sufficient length of cable to the Vibrator.
3. Ensure electric starters and other accessories are firmly fixed adequately supported
4. Ensure locking of needle load while inserting needle in to the vibrator,
5. Ensure periodical lubrication and maintenance

13.2.2.6 Concrete Mixers

1. Setting of machine on firm and level ground with wheel locked to prevent movement of machine
2. Proper instructions and Special precautions are to be ensured to prevent entry in to the danger zone of projectile of bucket while dropping bucket

13.2.3 WELDING & GAS CUTTING SAFETY (HOT WORK)

1. All Hot Work shall require a Hot Work Permit
2. There shall be flash-back arrestors conforming to IS-11006 at both cylinder and burner ends. Damaged tube and regulators must be immediately replaced.
3. All safety precautions shall be taken for welding and cutting operations as per IS-818.
4. When possible, items to be welded, cut, heated, etc. shall be moved to a safe location free of combustible or flammable material. If this is not possible, then all combustibles/ flammables that can be removed from the area shall be removed within a 35-foot circumference and a positive means of confining arcs and sparks generated by the process shall be ensured and additional person(s) shall be stationed as fire-watch for the area(s)still exposed, along with obtaining the Hot Work Permit as applicable.
5. Appropriate fire-fighting equipment is to be available in close proximity of any welding and gas cutting operations at all times suitable for the type of Fire.
6. Drums, tanks, and similar containers that have contained flammable or toxic material shall not be welded, cut, or heated until they have been made safe by water filling, thorough cleansing or similar accepted practices. The container shall also be ventilated during the welding, cutting, or heating process.

7. Proper ventilation is required for any welding or torch operations performed in a confined space.
8. Any welding or gas cutting operations performed on metals of toxic compounds or coating such as zinc, stainless steel, lead, cadmium, chromium, and beryllium shall be properly ventilated and/or proper respiratory protection shall be worn by any person that could be exposed to fumes, vapors, and gasses created by the welding and gas cutting processes.
9. Wherever it is practical, all arc welding operations shall be shielded to prevent direct light rays or sparks from contacting persons in the vicinity or from reaching areas normally used to travel through or into the vicinity. Where this is not practical, persons who shall be in the area are to use proper eye and skin protection. Other persons who are not participating in the welding or gas cutting operations are not to be allowed into the hazard zone.
10. Welders and other employees who are exposed to arc welding radiation shall wear suitable clothing and protective apparel to prevent burns and other types of ultraviolet radiation damage to the skin.
11. Arc welding machines shall be shut down when being moved or when they are not in continuous use. Electrode holders left unattended shall have electrodes removed and shall not be left where they might contact employees or conducting objects.
12. Arc welding power supply cable shall be of proper rating and material, e.g. copper.
13. Welders shall guard against allowing materials adjacent to or behind them to reflect radiation back toward them or towards others in the area. Reflected radiation can cause skin burns and eye flash burns.
14. Valve caps shall be in place when cylinders are not in use. Valve caps shall never be used for lifting the cylinder vertically.
15. Torches shall only be lit by approved strikers; never with matches, cigarette lighters, or hot-work.
16. **Splatter / Slag Collector**

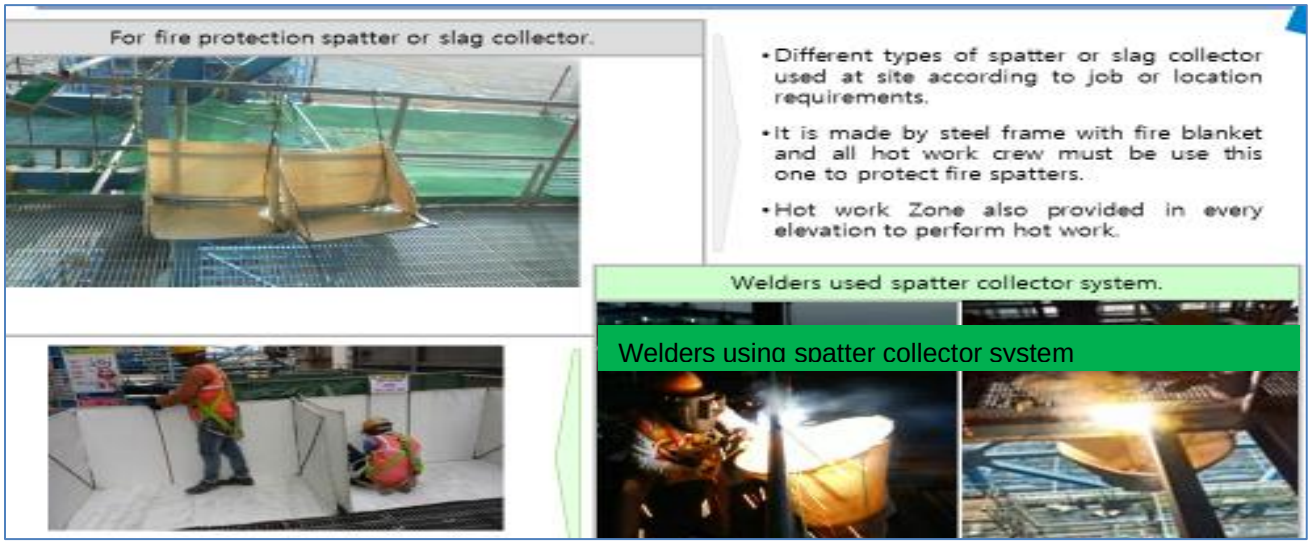


Fig. 13.2.3.1 Splatter / Slag Collector

While carrying out job at height, the sparks or molten slag shall be prevented from falling down by putting a fire-resistant (non-asbestos) sheet or patter/ slag collector or even MS Sheet. The passage of falling sparks or molten slag shall be barricaded till ground floor and any cable/ tubes/ any other objects interfering in the passages hall either be removed or covered with Fire-resistant sheet or MS Sheet.

13.2.3.1 COMPRESSED GAS

1. All cylinder valves shall be closed when any work is finished and when any Cylinders are empty or being moved. Valve protection caps shall be placed and secured properly before gas cylinders are transported, moved or stored.
1. Compressed gas cylinders shall be secured in an upright position with chain or appropriate means during storage & use. However, a trolley shall be used for transportation.
2. Compressed gas cylinders shall always be secured from tipping or falling, whether in use, in storage or in transit. The cylinders shall always be secured upright, except during times when actually being hoisted or carried.
3. When cylinders are transported by powered vehicle they shall be secured in a vertical position.
4. Regulators shall be removed when cylinders are not in use or are in transit, unless the cylinder is firmly secured on a special carrier designed for this purpose.
5. Gas cylinders are not allowed to be used in man-basket when occupied.
6. Cylinders containing oxygen or fuel gasses shall not be taken into confined spaces.
7. Oxygen cylinders shall be stored a minimum of 6 meters from fuel gas cylinders or shall have an approved firewall between them.
2. All cylinders shall be kept at a safe distance from welding or cutting operations or shielded from arc/ sparks / slag.
3. All cylinders shall be placed where they cannot become part of the electrical circuit.
4. Oxygen and acetylene shall not be stored together. Oxygen must be separated from acetylene (or ANY fuel gas) or combustible material by at least 20ft or a barrier with a 30 minute fire resistance rating.
5. All Cylinders should be stored upright in a designated area with labels for the type of gas. All applicable precautions to be ensured during storage
6. Oxygen and fuel gas regulators, hoses and associated equipment shall not be altered and shall be in proper working order while in use.
7. Compressed air can be extremely dangerous if allowed to penetrate the skin. As such, the use of compressed air to clean off yourself or other workers shall be strictly prohibited.
8. All gas cylinders shall be stored in upright position. Suitable trolley shall be used for cylinder movement, the design of which shall be submitted to BHEL Engineer for approval.
9. No of cylinders shall not exceed the specified quantity as per OCP
10. Cylinders shall be moved by tilting and rolling them on their bottom edges. They shall not be intentionally dragged, struck or permitted to strike each other violently.
11. All cylinder should be kept only in cylinder trolley.
12. Cylinder shall be transported in upright vertical position by suitable mean.

13.2.4 LIFTING & RIGGING SAFETY

1. All Heavy / Complex Lifting operations as defined in Clause 6.12 shall require a Lifting Work Permit.
2. All the cranes and lifting tools & tackles shall be inspected on daily / weekly basis as well as

monthly by expert as per applicable formats.

3. In addition, inspection / certification as mandated by law shall be carried out wherein these shall be tested and certificates of fitness shall be obtained from 3rd party State Govt. approved competent agency before deploying at site and later periodically. BHEL shall be given advance intimation of any such inspections
4. The last date of Third Party Inspection and the next Due date shall be conspicuously displayed on all cranes. A copy of certificate shall be pasted on operator's cabin of all the lifting equipment.
5. Following requirements shall be mandatorily followed, wherever applicable:
   a. The manufacturer's instruction for maintenance shall also be followed. All safety measures shall be followed.
   b. All tools tackles, lifting appliances; material-handling equipment etc. used by the subcontractor shall be of safe design and construction.
   c. The operators, slingers and signalers shall be qualified as per IS 13367 (part-1):2003 "Safe use of cranes- code of practices".
   d. There shall be a person responsible for co-ordination among cranes where multiple cranes are used, and lifting over 75% of the crane capacity to be avoided.
   e. Mobile phone should be banned for crane operator and lifting operation. Only walki talki shall be allowed in rigging/Lifting purpose.

13.2.4.1 Personnel Lifts (Man-Basket / Jhoola):

The design of personnel man basket shall be submitted to BHEL Engineer for approval before use. Relevant permit (Height work & others as applicable) shall be completed prior to lifting any people, along with a rigging plan.

a. A separate Lifeline / Fall arrestor anchored to a fixed structure outside of Jhoola shall be provided for the workers inside the basket. All occupants of the basket shall have Safety Harnesses equipped with rope grabs, which are to be hooked to the vertical lifeline.
b. Man-basket shall be used where access through ladders or scaffolding is not feasible.
c. Man-baskets shall be designed and engineered by a manufacturer (job made man-baskets are not allowed, unless designed and tested by a certified engineer), and built robust with MS Angles and flats or plates or channels only.
d. Guard rails top and mid, must be in place and screened-in to avoid material from falling out of basket. The factor of safety shall be 200%.
e. It shall have a door with double latches and shall open inside. Anchor points shall be identified within the man-basket.
f. The man-basket shall be thoroughly inspected and load tested and a trial run performed without personnel before being put to job.
g. It shall be treated as a lifting tool (T&P Item) and shall undergo same certification cycle and inspection as other lifting equipment.
h. An additional sling of required lifting capacity shall be fixed the man-basket main lifting point and attached to the crane above the ball or block.

i. While lifting man-basket, the crane shall maintain a uniform speed of lift without any swing.
j. Once man-basket reaches the destination, the lift brakes shall be locked as long as the basket remains at that point. The same care shall be taken in its descent.
k. As for hanging man-basket, the same shall be hung off a rigid structure with help U-shaped handle welded to man-basket. This shall be tested once in a year by a competent person.
l. Use of Rebar steel for making and monkey-ladder must be avoided.

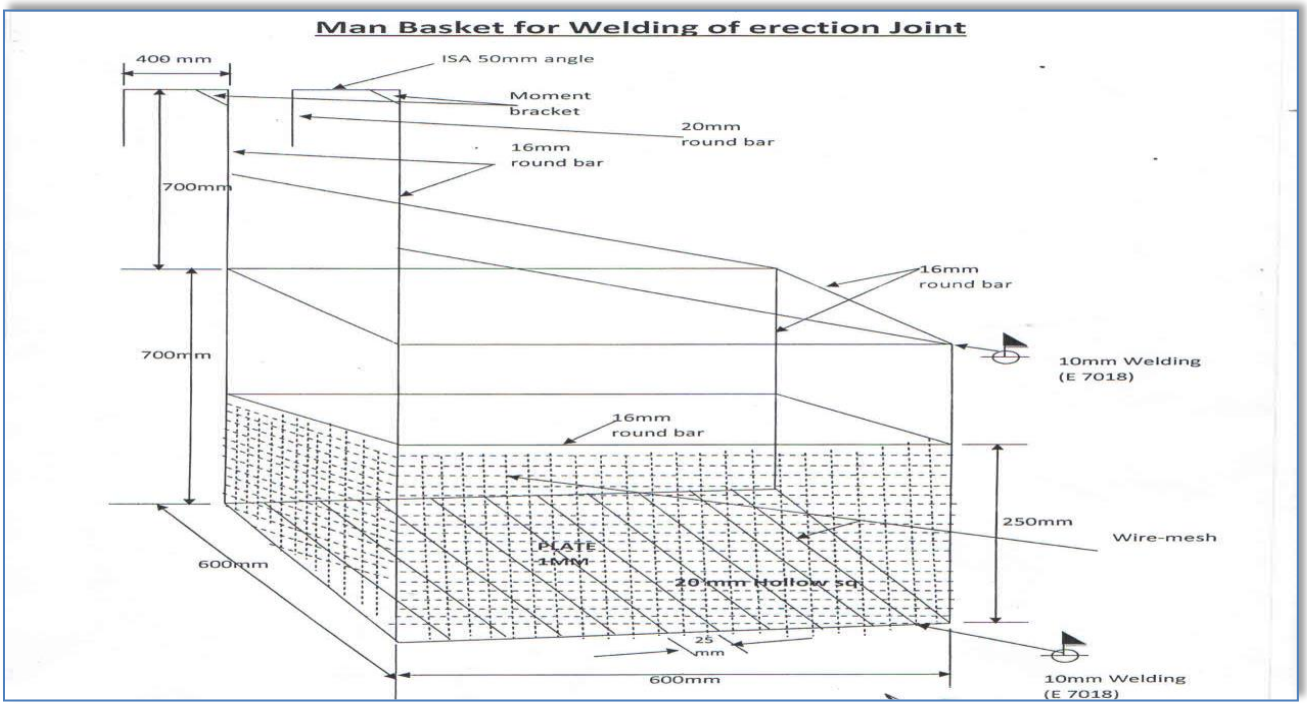


Fig. 13.2.4.1 Man Basket for Welding Erection Joint

13.2.4.2 **Cranes & Hoisting Equipment:**

This section provides the guidelines to ensure proper rigging and lifting activities are accomplished safely and in accordance with applicable specifications, codes, and regulations.

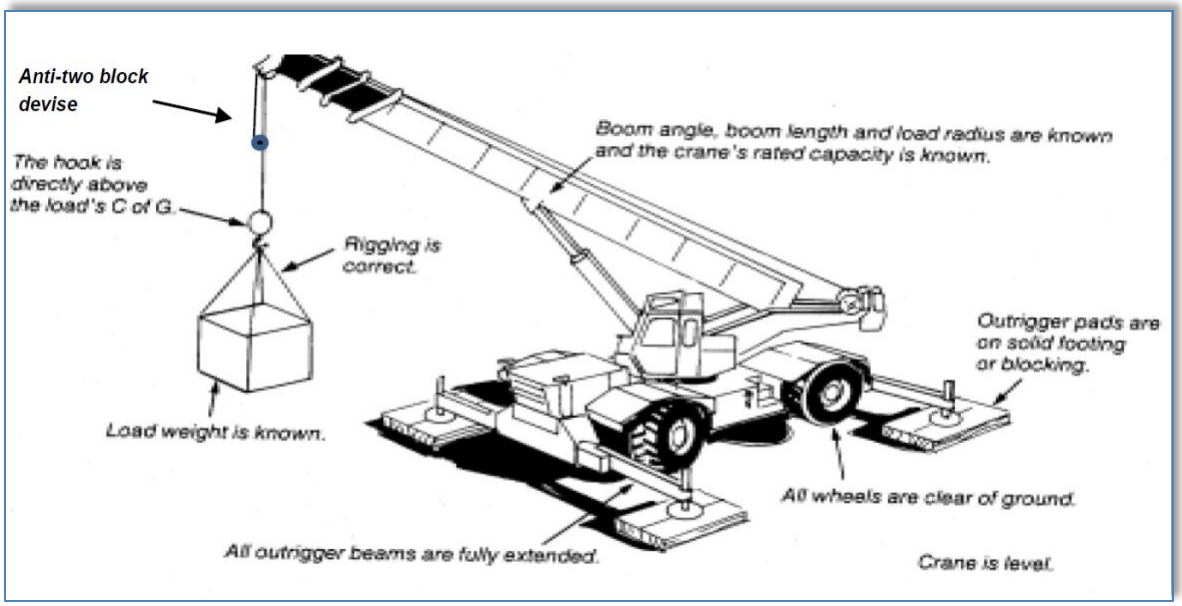


Fig. 13.2.4.2 Proper Crane Setup

a. On every crane or piece of hoisting equipment notices of all rated load capacities, recommended operating speeds, and any hazard warnings or special instructions shall be conspicuously posted. All instructions and warning shall be visible from the equipment operator ‘s station.
b. Cranes shall have an Anti-Two-block safety device installed
c. All mobile cranes shall have overload and backup alarms, load angle indicators and limit switches
d. All areas within swing radius of cranes that are potentially accessible by pedestrian, vehicular, or equipment movement shall be barricaded to prevent anyone or any vehicle or equipment from being struck by the crane or hoisting equipment, or its load(s).
e. No part of the lifting equipment or its load shall be within the distance as specified in the Indian Electricity Act from an energized power line
f. Cranes shall have annual certified third party inspection and be inspected before use by the operator. Any defects shall be corrected before use. Logs of crane inspection shall be kept with the crane.
g. Make certain that the rigging personnel, material, and equipment have the necessary capabilities for the job and are in safe condition.
h. Communicate with person(s) directly responsible for accomplishing the work and / or work area to establish requirements/responsibilities and make certain that all preparatory work is complete.
i. Mats/Pads must be used on all lifting equipment, equipped with out riggers.
j. Pick and carry must have the load secured to the rig in front.
k. Only BHEL Approved Plate Lifting Spreader Beam configuration shall be used (Sample in Fig. 13.2.4.2)

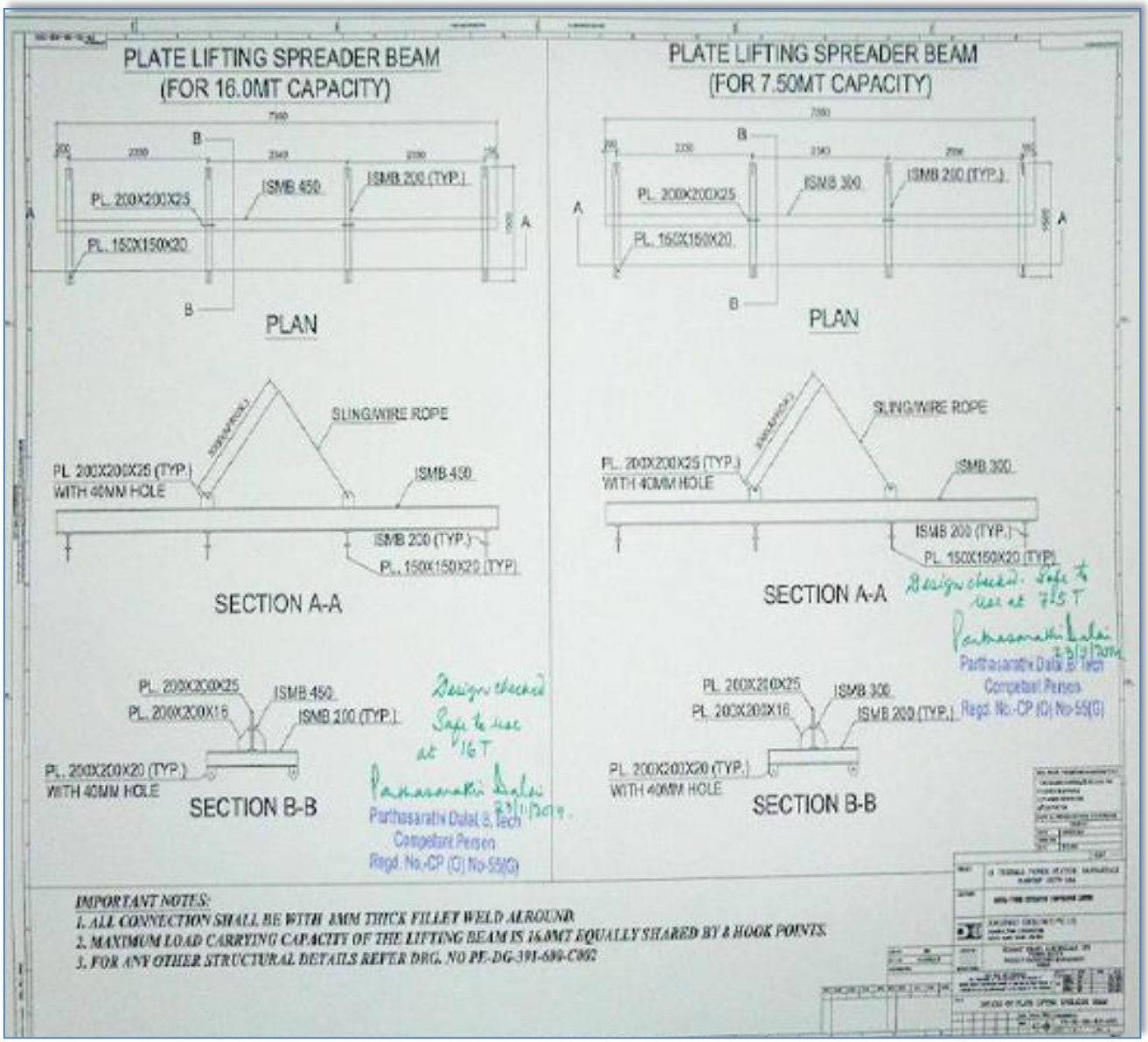


Fig. 13.2.4.3 Typical Plate Lifting Spreader Beam Configuration for 7.5 MT and 15 MT Loads

I. Crane operators must follow the following:

1. Pass an annual Operator's Physical examination
2. Carry a valid training certification card at all time while operating issued by the Govt. or other recognized institute.

13.2.4.3 SAFE RIGGING PRACTICES

13.2.4.4

a. Review the planned operation and requirements with the operator and rigging crew.
b. Ensure a pre-lift meeting is conducted with crane operator, tagline operator, signal personnel, and Safety Manager.
c. Designate a qualified person from the rigging crew to observe clearance of the equipment and give timely warning for all operations where it is difficult for the operator to maintain the desire clearance by visual means.
d. Clear the lift area of all unnecessary personnel.
e. Hydras shall only be allowed for loading & unloading works & shall not be allowed to move with load

13.2.4.4.1 RULES FOR SAFE RIGGING

1. Use loops, thimbles and corner pads to prevent damage to slings when used around corners or on cutting edges.
2. Never allow wire rope to lie on the ground for any length of time or on rusty steel or near solvents, chemicals or corrosive substances.
3. Slings must not be pulled from between or under loads with load resting on the sling.
4. Keep all rope away from flame cutting or welding operations.
5. Never use rope as sling material.
6. Never wrap a wire rope completely around a hook.
7. Do not bend wire rope near any attached fitting.
8. The sling must be selected to suite the most heavily loaded leg rather than the total weight when using multi-legged sling to lift loads in which one end is heavier than the other.
9. When using 3 and 4 legged sling configurations, any two legs must be capable of supporting the entire load.
10. Where possible, wire rope choker hitches must include a shackle with the eye around the shackle pin to prevent breaking wires of the choke. The choker hitch must be “snugged down” prior to lifting, not after tension is applied.
11. Unless authorized by the hook manufacturer when more than two rope eyes are placed over a hook, install a shackle, pin resting in the hook, and place the rope eyes in the bowl of the shackle.
12. Properly rig all loads to prevent dislodgment of any part.
13. Use guide ropes or tag lines to prevent the rotation or uncontrolled motion of the load when necessary.
14. Loads must be safely landed and properly blocked before being unhooked and unslung. Tag lines must not be used in situations that jeopardize the safety of the lift.
15. Lifting beams must be plainly marked with their weight and designed working load and must only be used in the manner for which they were designed.

16. The hoist rope or chain must never be wrapped around the load. The load must be attached to the hook by slings or other rigging devices that are adequate for the load being lifted.
17. Multiple part lines must not be twisted around each other.
18. The hook must be brought over the center of gravity of load before the lift is started.
19. If there has been a slack rope condition, determine that the rope is properly seated on the drum and in the sheaves prior to lifting.
20. Keep hands away from pinch points as the slack is being taken up.
21. Leather gloves are recommended when handling wire rope.
22. Avoid impact loading caused by sudden jerking when lifting or lowering. Lift the load gradually until the slack is eliminated.
23. Never ride on a load that is suspended.
24. Avoid allowing the load to be carried over the heads of any personnel.
25. Never work under a suspended load until the load has been adequately supported from the floor and all conditions have been approved by the supervisor in charge of the operation.
26. Never leave a load suspended unless emergency evacuation is required.
27. Never make temporary repairs to sling.
28. The capacity of a sling is determined by its angle, construction, type of hitch and size.
29. Never lift loads with one leg of a multi-leg sling until the unused legs are made secure.
30. Never point load a hook unless it is especially designed and rated for such use.
31. Make certain that the load is broken free before lifting and that all legs are taking the load.
32. When using two or more slings on a load make certain all slings are made from the same materials.
33. Lower the loads on to adequate blocking to prevent damage to the slings.
34. Materials and equipment being hoisted must be loaded and secured to prevent any movement which could create a hazard in transit.
35. The weight of the hook, load block and any material handling devices must be included when determining crane capacity.
36. Calculated weights cannot exceed 75% of the chart without written approval.
37. Personnel must be completely clear of loads being picked up or set down by crane. Tag lines will be used to control the loads. Loads must not be touched by hand while placing/ moving.

13.2.4.4.2 SLINGS

a. Synthetic Slings

The following are rules for safe use of synthetic slings:

i. Synthetic slings must be marked to show the rated capacity for each type of hitch and type of web material.
ii. Nylon web slings must not be used where fumes, vapors, sprays or mists or liquids of acids or phenolic are present. Web slings with aluminum fittings must apply in this category.
iii. Synthetic web slings must be removed from service and destroyed if any of the following conditions are present:

a. Acid or caustic burns
b. Melting or charring of any part of the sling surface
c. Snags, punctures, tears or cuts
d. Broken stitches
e. Distortion of fittings
f. Synthetic web slings of polyester or nylon must not be used at or come in contact with temperatures in excess of 82°C
g. Polypropylene web slings must not be used at or come in contact with temperatures in excess of 93°C
h. Insulated hooks must be tested yearly to insure insulation integrity to at least manufacturer's specifications.

iv. Wire Rope Slings must be removed from service and destroyed if any of the following conditions are present:

a. In (10) randomly distributed wires broken in one (1) rope lay, or five (5) broken wires in one (1) strand in one (1) rope lay.
b. Wear or scraping of one-third the original diameter of outside wires.
c. Kinking, crushing, bird caging or any other damage resulting in distortion of the wire rope structure such as:
d. Evidence of heat damage.
e. End attachments that are cracked, deformed worn.
f. Corrosion of the rope or end attachments.

v. Metal mesh slings must be immediately removed from service if any of the following conditions are present:

a. A broken weld or broken brazed joint along the sling edge.
b. Reduction in wire diameter of 25 percent due to abrasion or 15 percent due to corrosion.
c. Lack of flexibility due to distortion or corrosion.

vi. Synthetic web slings must be removed from service and destroyed if any of the following conditions are present:

a. Acid or caustic burns
b. Melting or charring of any part of the sling service
c. Snags, punctures, tears or cuts
d. Broken stitches
e. Distortion of fittings

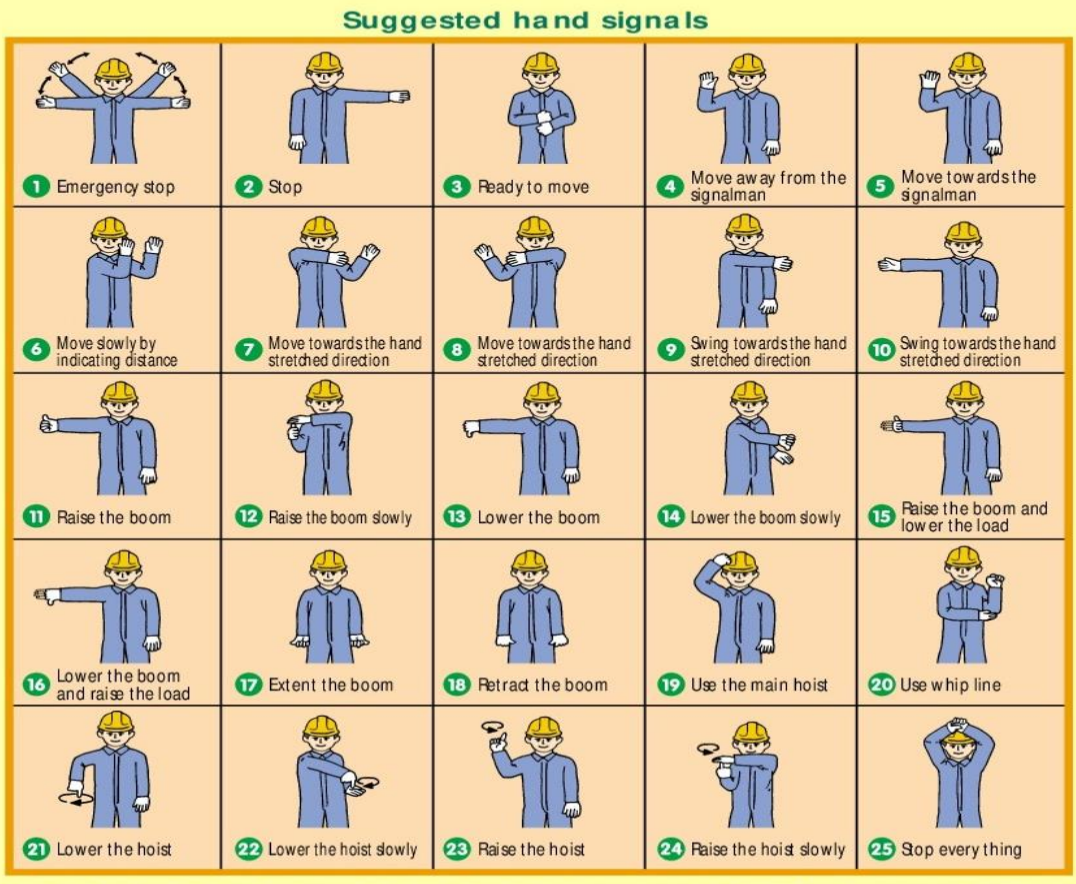
vii. Requirements of Plate Clamps:

1. The rated load of the plate clamp must be marked on the main structure.
2. Care must be taken to make certain the load is correctly distributed for the plate clamp being used.
3. Do not allow load or plate clamp to come into contact with any obstruction.
4. The plate clamp must not be used for side pulls or sliding the load.
5. When lifting stainless steel or special alloys, ensure plate clamp is designed for use on

the specific metal.

13.2.4.4.3 SIGNALING PRACTICES:

- The "slinger" is responsible for attaching and detaching the load to and from the crane. He shall:
  - have received appropriate training on general safe lifting operations;
  - be capable of selectings lifting gears suitable for the loads;
  - liaise with the operator and direct the movement of the crane safely.
- The "signaller" is responsible for relaying the signal from the slinger to the crane operator. He shall:
  - have received appropriate training on general safe lifting operations;
  - be able to direct the movement of the crane and loads.



Note: During the lifting operation, either the slinger or signaller shall communicate with the operator. Other communication methods (e.g., wireless walkie-talkies, telephones, etc.) may also be used.

Fig. 13.2.4.4 Recommended Signalling Practices

13.2.5 DEMOLITION WORK

Before any demolition work is commenced and also during the process of the work the following shall be ensured, besides using the Work Permit:

1. All roads and open areas adjacent to the work site shall either be closed, suitably protected or restricted for movement
2. No electric cable or apparatus which is liable to be a source of danger nor a cable or an apparatus used by the operator shall remain electrically charged.
3. All practical steps shall be taken to prevent danger to persons employed from the risks of fire or explosion or flooding. No floor, roof or other part of the building shall be so overloaded with debris or materials as to render them unsafe.

13.2.6 T&Ps General

1. All T&Ps/ MMEs should be of reputed brand/appropriate quality & must have valid test /calibration certificates bearing endorsement from competent authority of BHEL.

2. Subcontractor to also submit monthly reports of T&Ps deployed and validity test certificates to BHEL safety Officer as per the format/procedure of BHEL.

3. Tagging and punching in all lifting tool is compulsory with SWL, sr. no. and due date.

4. All T&Ps shall be inspected by authorized Third Party agency as per applicable frequency. BHEL shall be kept informed of any such scheduled inspection

5. All T&Ps shall be internally inspected in each quarter and colour coded as below.

13.2.6.1 T&P Color Coding Procedure:

Inspections and tests shall be documented by means of color coding which shall verify that inspections or testing are current and that all receptacles, portable Power tools, Lifting Tools & Tackles have been inspected and tested as required. The color codes used on the project shall be:

GREEN	BLUE	YELLOW	RED
January February March	April May June	July August September	October November December

Table. 13.2.6.1 T&P Color Coding Procedure

i. The cycle of colors shall be Quarterly as a minimum or as decided by BHEL. The color code tape / Sticker shall be clearly visible to designate the period for which the inspections and tests were conducted.

ii. Following the initial inspection, the equipment must be color-coded quarterly as per color-coding instructions that will be issued by the subcontractor.

iii. Fire extinguisher with the current month color-coding inspection sticker must be provided and secured in the platform.

iv. All slings shall be regularly inspected in accordance with the requirement of the project for frequent and periodic inspections and discard immediately if they fail to meet the minimum requirements of the project.

v. The Subcontractor's Safety Officer shall ensure that all PPE is inspected prior to its issue. He is to ensure all subcontractor personnel are using safe and proper PPE equipment. Regular inspections on the PPE shall be carried out and personnel not adhering to those inspections shall be removed immediately from the site.

vi. A five (10) day interval period shall be given into each monthly color code change. During this five (10) day period either color shall be acceptable.

13.2.7 CHEMICAL HANDLING

1. Displaying safe handling procedures & MSDS for all chemicals such as lube oil, acid, alkali, sealing compounds etc, at work place.
2. Where it is necessary to provide and/or store petroleum products or petroleum mixture & explosives, the subcontractor shall be responsible for carrying out such provision / storage in accordance with the rules & regulations laid down in the relevant petroleum act, explosive act and petroleum and carbide of calcium manual, published by the chief inspector of explosives of India. All such storage shall have prior approval if necessary from the chief inspector of explosives or any other statutory authority. The subcontractor shall be responsible for obtaining the same.
3. The used containers of chemicals shall be segregated and disposed off suitably
4. In case the used containers need to be re-used, all traces of the chemical to be removed by thorough cleaning with detergents etc. under trained supervision

13.2.8 ELECTRICAL SAFETY

1. Only electricians licensed by appropriate statutory authority shall be employed by the subcontractor to carry out all types of electrical works. The subcontractor shall maintain adequate number of qualified electricians to maintain his temporary electrical installations.
2. Power supply to all equipment at site to be routed through MCBs of appropriate rating. A 'Power Supply Distribution Plan' shall be prepared and submitted to BHEL Engineer for approval

3. All power supplies through cables shall be underground or overhead with height > 3mtrs.
4. All distribution boxes shall be locked and the key controlled by site management of concerned subcontractor.
5. All individual equipment & tools at site shall be powered through Earth Leakage Circuit Breakers of 30 mA sensitivity.
6. These MCBs and ELCBs shall be regularly tested as per Clause 14
7. All fuses and fuse wires shall be of standard size and rating.
8. All electrical appliances used in the work shall be in good working condition and shall be properly double earthed other that armour earthling.
9. All extension boards shall have separate switches for all sockets / connections
10. All portable electric tools used by the subcontractor shall have safe plugging system to source of power and be appropriately earthed.
11. Providing adequate no. of 24 V sources and ensure that no hand lamps are operating at voltage level above 24 Volts especially in confined spaces like inside water boxes, turbine casings, condensers etc.
12. Electrical appliance shall have proper earthing and for appliances equal to & more than 415V shall have two separate earthing (as per IS-3043-1987)
13. Details of earth resource ad their test date to be given to BHEL safety officer as per the prescribed formats of BHEL
14. The subcontractor shall use only properly insulated and armoured cables and conform to the requirement of Indian Electricity Act and Rules for all wiring, electrical applications at site.
15. BHEL reserves the right to replace any unsafe electrical installations, wiring, cabling etc. at the risk & cost of the subcontractor.
16. No maintenance work shall be carried out on live equipment
17. Adequate precautions shall be taken to prevent danger for electrical equipment. No materials on any of the sites of work shall be so stacked or placed as to cause danger or inconvenience to any person or the public
18. The subcontractor shall carefully follow the safety requirement of BHEL/ the purchaser with the regard to voltages used in critical areas.
19. Wiring and Branch Circuits Must be protected by a proper amperage over-current device such as a HRC fuse or circuit breaker. Such installations must be located so as to prevent physical damage to the wire conductors & panels.

20. Portable Electric Lights

a. Portable electric lights used in wet or potentially wet locations must be either low voltage type (24 volts or less) or protected by a GFI (ground fault interrupter).
b. They must be visually checked before each use and periodically while in use to assure their original integrity is maintained.
c. Cords with cuts, breaks, deep abrasions, etc. shall be taken out of service immediately.
d. Repairs to extension cords shall only be performed by qualified/ licensed electricians.
e. Must not be allowed to lie in wet or potentially wet areas.

21. Underground Cables:

a. Every electric line or cable of unknown origin that is discovered or exposed during a digging, drilling, probing, or similar operation is to be considered as energized and life threatening.
b. The senior company employee on the site will ensure that all necessary safety precautions are taken in order to isolate the line from all workers and the public.
c. Such precautions may include halting the operation if appropriate.
d. The senior company employee on the site is to then contact the proper authorities to have the line identified and either confirmed to be abandoned and/or made safe for continuing the work.
e. Any and all underground lines that are discovered or become severed must be considered energized on both sides, and be treated accordingly.

22. In general, equipment or machinery being moved or transported must maintain minimum clearances of 25 ft. to all power lines.
23. TAG IN/ TAG OUT must be in force in Switch Room and all Distribution Boxes for live power line. The authorized person's name and contact no shall be displayed
24. Ensure "double insulated" three - core cables and three pin connectors are used and are properly ground "all insulated" types, all electrical tools and appliances must be manufactured for industrial use.
25. All connections shall be electrically and mechanically sound and properly insulated. Taped joints are not permitted. Connections to socket outlets must be made with proper plugs.
26. Splices in electrical cords are not permitted. Repairs must be made at the socket connection and retain the same mechanical and dielectric condition of the original connection.
27. Damaged or defective electric tools, equipment and extension cords, etc. must not be used and shall be tagged out of service, removed from the work area and taken back to stores.
28. Only licensed electricians are authorized to repair and work on electrical equipment. Tampering with electric tools or equipment by others could result in termination.
29. Temporary electric cabling should be elevated 2.2 meters above the floor/ground or covered for protection. It must be kept clear of walkways and other locations where it may be exposed to damage or create a tripping hazard.
30. Energized wiring in junction boxes, circuit breaker panels and similar places must be covered and locked at all times.
31. Areas with live high voltage wires or terminals must be barricaded against entry and warning signs posted Danger – High Voltage and Authorized Personnel Only.
32. Personnel should never work on energized equipment, de-energizing (lockout/tag out) the equipment is always the first requirement.
33. The lockout and tag out procedure will be used when testing or working on, or around, energized installation.
34. Working around energized equipment should never be done alone. A second electrician must always be available for assistance.

35. If lockout/tag out of the work is infeasible (must be demonstrated), work on energized electrical circuits must be approved by the Site In-charge. All safety precautions necessary must be taken, PPE use must be evaluated per the exposure and used, i.e high/low voltage gloves, insulated shoes, overcoats/aprons, face shields, and other protective equipment like insulated tools, blankets, mats, etc. must be used.
36. The welding machines earth leads shall be properly fixed without loose contacts. The earth cable only has to be used. No steel members shall be used as earth leads.
37. Electrical crews must be qualified for the equipment and tools they work on, including being trained in Cardio-Pulmonary Resuscitation (CPR) methods and First Aid for rendering help in the event of electric shock.

38. Qualified Persons for Electrical Works

One who is trained and wiremen licensed to Govt of State and familiar with the construction, operation and safety hazards of the equipment upon which they are permitted to work.

i. Qualified persons are intended to be only those who are well acquainted/experienced with and thoroughly conversant in the electric equipment and electrical hazards involved with work being performed.
ii. Only qualified persons may be permitted to work on or near exposed energized parts. Such persons are required to have been trained in three specific areas:
iii. Qualified persons must be capable of working safely on energized circuits;
iv. Must be familiar with the proper use of special precautionary techniques and procedures bases on equipment and exposure; and
v. Must be familiar with required personal protective equipment, insulating and shielding materials, and insulated tools.
vi. Qualified persons are expected to be able to evaluate unknown situations and adjust their activities in such a way that only safe work practices are used. Such behavior is the responsibility of the qualified person.
vii. It is possible and likely for an individual to be 'qualified' with regard to certain equipment in the work place, and unqualified on other equipment they must know their limitation and stop work if not qualified on what equipment they were to work on.
viii. An employee who is undergoing on-the-job training, who, in the course of such training, has demonstrated an ability to perform duties safely at his or her level of training, and who is under the direct supervision of a qualified person is considered to be a qualified person for the performance of those duties. The process must be documented as proof.

13.2.9 USE OF HAND TOOLS AND POWER-OPERATED TOOLS

13.2.9.1 General Provisions

a. All hands and power tools and similar equipment, shall be maintained in safe condition.
b. When power operated tools are designed to accommodate guards, they shall be equipped
c. with such guards, when in use;
d. Belts, gears, shafts, pulleys, sprockets, spindles, drums, fly wheels, chains and other reciprocating, rotating or moving parts of the equipment shall be similarly guarded;
e. Personnel using hand and power tools and exposed to the hazard of falling, flying, abrasive, and splashing objects, or exposed to harmful dusts, fumes, mists, vapors, or gases shall be

provided with the particular personal protective equipment necessary to protect them from the hazards;

f. All hand-held powered platen sanders, grinders, grinders with wheels of 5 cm or less, routers, planers, laminate trimmers, nibblers, shears, scroll saws and jigsaws with blade shanks of 0.5 cm wide or less shall be equipped with only a positive on-off control.
g. All hand-held powered drills, tappers, fastener drivers, horizontal, vertical or angle grinders with wheels greater than 5 cm in diameter, disc sanders, belt sanders, reciprocating saws, saber saws and other operating powered tools shall be equipped with a momentary contact on control provided that turnoff can be accomplished by a single motion of the same finger or fingers that turn it on.

13.2.9.2 Hand Tools

a. The subcontractor shall not issue or permit the use of unsafe hand tools;
b. Wrenches including adjustable pipe end and socket wrenches shall not be used when saws are sprung to the point that slippage occurs;
c. Impact tools such as drift pins, wedges and chisels shall be kept free of mushroomed heads;
d. The wooden handles of tools shall be kept free of splinters or cracks and shall be kept tight on the tools.

13.2.9.3 Power Operated Tools

a. Electric power operated tools shall be either of the approved double-insulated type or shall be grounded;
b. The use of electric cords for hoisting or lowering loads shall not be permitted;
c. Pneumatic power tools shall be secured to the hose or whip by some positive means to prevent the tool from becoming incidentally disconnected;
d. Safety clips or retainers shall be securely installed or maintained on pneumatic impact (percussion) tools to prevent attachments from being incidentally expelled;
e. All pneumatically riveting machine staplers and other similar equipment provided with automatic fastener feed, which operate at more than 7 kg/cm2 pressure at the tool a safety device on the muzzle to prevent the tool from ejecting the fasteners unless the muzzle is in contact with the work surface;
f. Compressed air shall not be used for cleaning purposes except when the pressure is reduced to less than 2 kg/cm2 and that too with effective chip guarding. The 2 kg/cm2 pressure requirement does not apply to concrete form, mill scale and similar cleaning purposes;
g. The manufacturer's safe operating for hoses, pipes, valves, filters and other fittings shall not be exceeded;
h. Only personnel who has been trained in the operation of the particular tool shall be allowed to operate power-actuated tools;
i. The tool shall be tested each day before loading to see that the safety devices are in proper working condition. The method of testing shall be accordance with the manufacturer's

recommended procedure;

j. Any tool found not in proper working order, or that which develops a defect during use, shall be immediately removed from service and not used until properly repaired;
k. Tools shall not be loaded until just prior to the intended firing time. Neither loaded nor empty tools are to be pointed at any other person. Hands shall be kept clear of the open barrel end;
l. Loaded tools shall not be left unattended;
m. Fasteners shall not be driven into very hard or brittle materials including, but not limited to, cast iron, glazed tiles, surface hardened steel, glass block, live rock, face brick or hollow tiles;
n. Driving into materials that can be easily penetrated shall be avoided unless backed by a
o. substance that will prevent the pin or fastener from passing completely through and creating a flying missile hazard on the other side;
p. No fastener shall be driven into a palled area caused by an unsatisfactory fastening;
q. Only non-sparking tools shall be used in an explosive or flammable atmosphere;
r. All tools shall be used with the correct shield, guard or attachment as recommended by the manufacturer.

13.2.9.4 Abrasive Wheels and Tools

a. All grinding wheel must be ISO certified only.
b. All grinding machines shall be supplied with sufficient power to maintain the spindle speed at safe levels under all conditions of normal operation;
c. Grinding machines shall be equipped with suitable safety guards;
d. The maximum angular exposure of the grinding wheel periphery and sides shall not be more than 900, except that when the work requires contact with the wheel below the horizontal plane of the spindle, the angular exposure shall not exceed 1200. In either case, the exposure shall begin not more than 8.650 above the horizontal plane of the spindle. Safety guards shall be strong enough to withstand the bursting of the wheel;
e. Floor and bench-mounted grinders shall be work-rests, which shall be rigidly supported and readily adjustable. Such work-rests shall be kept at a distance not to exceed 5 mm from the surface of the wheel;
f. Cup type wheels used for external grinding shall be protected by either revolving cup guard or a band type guard;
g. When safety guards are required, they shall be mounted as to maintain proper alignment with the wheel and the guard and the guard and its fastening shall be adequate strength to retain the fragments of the wheel in case of incidental breakage. The maximum angular exposure of the grinding wheel periphery and sides shall not exceed 1800;
h. Portable abrasive wheel used for internal grinding shall be provided with suitable safety flanges;
i. When safety flanges are required, they shall be used only with wheels designed to fit the flanges. Only safety flanges, of a type and design and properly assembled so as to ensure that the pieces of the wheel will be retained in case of incidental breakage, shall be used;
j. All abrasive wheels shall be closely inspected and ring tested before mounting to ensure that

they are free from cracks or defects;

k. Grinding wheels shall fit freely on the spindle and shall not be forced on. The spindle nut shall be tightened only enough to hold the wheel in place;
l. All employees using abrasive wheels shall be protected by suitable eye protection equipment.

13.2.9.5 Wood Working Tools

a. All fixed power driven woodworking tools shall be provided with a disconnect switch that can either be locked or tagged in the off-position;
b. The operating speed shall be attached or otherwise permanently marked on all circular saws over 0.5 m in diameter or operating at over 3000 peripheral rpm. Any saw so marked shall not be operated at a speed other than that marked on the blade. When a marked saw is re-tensioned for a different speed, the marking shall be corrected to show the new speed;
c. Automatic feeding devices shall be installed on machines wherever the nature of the work will permit. Feeder attachments shall have the feed rolls or other moving parts covered or guarded so as to protect the operator from hazardous points;
d. All portable power driven circular saws shall be equipped with guards above and below the base plate or shoe. The upper guard shall cover the saw to the depth of the teeth, except for the minimum arc required to permit the base to be tilted for bevel cuts. The lower guard shall cover the saw to the depth of the teeth, except for the minimum arc required to allow proper retraction and contact with the work. When the tool is withdrawn from the work, the lower guard shall automatically and instantly return to the covering position.

13.2.10 START UP, COMMISSIONING AND TESTING:

There are various activities involved prior to commissioning- the major ones are -Hydraulic Test, Steam Blowing, Transformers Charging, Boiler Light Up, Rolling and Synchronisation and Full loading of unit.

a. These activities shall be personally supervised by the site executive along with the commissioning engineer.
b. Appropriate Work Permits shall be taken as applicable
c. The readiness of upstream and downstream system shall be ensured before taking up.
d. These shall be handled strictly by the authorized persons only and the team shall be suitably briefed about the activity including hazards & risks involved and control plan by the concerned executive-in-charge before start.
e. Entry of persons to the area of activity shall be suitably restricted and the emergency functions like Ambulance, first aid center and Fire station shall be intimated about the plan well in advance.
f. Tag-in/ Tag-out shall be in place while charging transformer and whenever necessary.
g. Electricians with valid wiremen license only shall be permitted to work on power lines.
h. The area and the passage shall be adequately illuminated.

13.2.11 FIRE SAFETY

Numbers and types of Fire Extinguishers shall be ensured as follows:

Sl. No	Type of Fire Risk (Class of Fire)	Extinguishing Medium & Relevant Indian Standard	Scale of Equipment (Minimum recommended)
1.	**CLASS 'A'** Fires involving ordinary combustible materials like wood, paper, textiles, rubber etc. (Ordinary hazard or low fire load)	WATER Soda acid type, water type (gas pressure) and water type (constant air pressure) IS: 934 -1976; IS: 940 -1976; IS: 6234 -1971	For every 600 square meter floor area or part, one 9-litre capacity. Minimum 4 numbers per floor or room; should not be required to travel more than 15 meter to reach any extinguisher.
2.	**CLASS 'A'** (Extra hazard & high fire load)	-do	-do – (Also, consult local fire authority).
3.	**CLASS 'A'** (Special hazards)	-do	-do – Extra provision For every 100 square meter floor area or part, one 4.5 Kg. CO2; minimum 2 numbers per room; should not be required to travel more than 10 meter to reach any extinguisher.
4.	**CLASS 'B'** (Fires in flammable liquids like oils, solvents, petroleum, products, varnishes, paints, etc. where blanketing effect is essential) (Storage and handling in small quantities)	FOAM / CARBON DIOXIDE / DRY CHEMICAL POWDER IS: 933 -1976; IS: 2878 1976; IS: 2171 1976; IS: 4308 -1982	For every 50 square meter floor area or part, 2 numbers 9 -liters foam or 5 kg dry powder; should not be required to travel more than 10 m in the area of storage to reach any extinguisher.
5.	**CLASS 'B'** (Bulk storage other than in tank form)	-do -	-do- (but minimum 3 numbers per room)
6.	**CLASS 'C'** (Fires involving gaseous substances under pressure where it is necessary to dilute the burning gas at a very fast rate with an inert gas or powder) (locations of storage and handling of gas cylinders)	CARBON DIOXIDE / DRY CHEM. POWDER. The best way to extinguish such fire is by stopping the flow of fuel gas to the fire. Container is kept cool with water spray. IS: 2878 1976; IS: 2171 -1976; IS: 4308 -1982	For every 100 square meter floor area or part; 2 numbers, 10 kg powder extinguisher or 6 kg C02; minimum 3 nos. per room; should not be required to travel more than 10 meter to reach any extinguisher.
7.	**CLASS 'D'** Fires involving metals like magnesium, aluminum, zinc, potassium etc. where the burning metal is reactive to water and which require special extinguishing media or technique	SPECIAL DAY POWDER IS: 2171 -1976 IS: 4861 -1968	For every 50 square meter floor area or part, 2 nos. 5 kg special dry powder; minimum 3 nos. per room; should not be required to travel more than 10 meter to reach any extinguisher.
8.	**MIXED OCCUPANCY** (electrical); Generators; Transformers; etc.	CARBON DIOXIDE DRY POWDER, IS: 2878 -1976; IS: 2171 -1976	For every 100 square meter floor area or part one 10 kg C02. Minimum 2 numbers for every location should not be required to travel more than 10 meter to reach an extinguisher.
Note: Due to peculiarities of the power plant construction sites, there would be locations in the construction areas of Boiler, Turbine, Generator, Transformer, etc. where different types of fire risk (classes of fire) may co-exist. Special			

care shall be taken while selecting and installing portable fire extinguishers for such locations so that all types of fire risk that may co-exist, are adequately covered. Similar special care shall be taken for storage areas.

1. All Electrical welding booths shall be equipped with appropriate Fire Extinguisher
2. Appropriate Fire Extinguishers shall be made within easy reach of all welding operations
3. Fire extinguishers shall be regularly tested and last checked date to be indicated on each.
4. Providing appropriate firefighting equipment at designated work place and nominate a fire officer/warden adequately trained for his job.
5. Subcontractor shall provide enough fire protecting equipment of the types and numbers at his office, stores, temporary structure in labour colony etc. Such fire protection equipment shall be easy and kept open at all times.
6. The fire extinguishers shall be properly refilled and kept ready which should be certified at periodic intervals. The date of changing should be marked on the Cylinders.
7. All other fire safety measures as laid down in the “codes for fire safety at construction site” issued by safety coordinator of BHEL shall be followed.
8. Non-compliance of the above requirement under fire protection shall in no way relieve the subcontractor of any of his responsibility and liabilities to fire incident occurring either to his materials or equipment or those of others.
9. Emergency contacts nos. must be displayed at prominent locations
10. Tarpaulin being inflammable should not be used (instead, only non-infusible covering materials shall be used) as protective cover while preheating, welding, stress relieving etc. at site.

13.2.12 HSE PREPAREDNESS FOR ADVERSE CLIMATES AND WEATHER

Subcontractor to remain updated on possible adverse weather conditions through reliable sources and all precautions taken accordingly.

13.2.12.1 SUMMER

1. The Working Time and Lunch Hour will be as per instruction of Statutory Authorities (no work between 11am to 3:30pm). However, in case temp comes down due to rain/cloudy weather work will continue as per normal routine.
2. During long lunch break, worker will be allowed to go back home for rest. Those who will like to stay back will avail at the facility of rest shed or other designed area.
3. They will be allowed to take small break during work as per their need.
4. Water sprinkling will be done on roads to reduce dust concentration.
5. Workers will be provided with adequate cool drinking water and Butter milk/Lemon water etc.
6. Adequate ORS stock will be made available at the work location in the First-Aid Box for use as needed and at First-aid Center for emergency need.
7. Fire prevention shall be on high alert, with removal of dry grass and bushes, etc, inside and outside the surrounding work areas. No smoking, and control of open flame/sparks shall be maintained and monitored.
8. Worker will be informed about the Do’s and Don’ts to be followed during summer in the Pre Job Brief.

Do's & Don'ts

9. Drink plenty of cool water and other non-alcoholic fluid and keep body well hydrated.
10. Eat salt in food to replenish loss of salt through sweating.
11. Avoid over physical exercise.
12. Have adequate sleep at night.
13. Eat light and less spicy food
14. Avoid eating food which was cooked long time ago.
15. Nobody should use small water bodies such as pits, running rain water through crevices etc. for drinking and cleaning purpose as it may be unhygienic.

Emergency Handling

In case of emergency due to heat disorder:

16. Rescue the victim from workplace and place under shed.
17. If to be rescued from height, use stoke basket or rescue kit.
18. Inform Ambulance immediately.
19. If nearby any air conditioned room/shed is available, place him inside the room/shed.
20. Administer First aid by trained First aider for Heat Disorder
21. If conscious, give him ORS solution to drink.
22. If required send the victim hospital immediately.

13.2.12.2 Monsoon

A. Height Work & Structural Safety:

1. Ensure that all height work platforms are barricaded and avoid any highly hazardous
2. height work.
3. Ensure that all personnel have good quality and intact safety shoes
4. Stop all dangerous height work during rain
5. Explain Do's and Don'ts to workers during Tool Box Meetings
6. Ensure that there are no weak structures, boards etc. that can fall during high winds
7. Do not allow any loose material (e.g. GI sheet, Ply board, empty cement bag, aluminum foil, foam sheets etc.) on roof sheds or top of structures.
8. Do not permit any one to ride up or come down scaffolds frame work during heavy wind or rain.
9. Provide "anchor" of adequate strength to scaffolds and other high-rise structures.
10. All rest sheds and GI sheds will be anchored into the round and wall and roof panels will be secured with J hook to prevent shed from blowing over or parts/pieces becoming airborne. Proper earthing per IS standard is also to be installed.
11. Do not go alone nor permit anyone to stay at tower-tops, roof-tops, high structures or on electrical poles during the course of stormy weather or heavy rain.

B. Electrical:

1. All electrical connections / loads have to be routed through ELCB / RCCB (residual current circuit breaker) whose rating should be 30mA.
2. RCCB operational checks need to be done DAILY / WEEKLY during monsoon season.
3. Avoid joints on power cables which need to be laid over-head or under-ground, better not to have any joint at all. In case joints become essential, such cables must be housed rigidly and insulation must be provided as per approved standard. The joint shall be suitable for outdoor use.
4. All electrical distribution board shall be properly covered at top and sides to protect from rain water. Extension boards shall be protected from rain water.
5. Ensure proper “earthing” for each and every electrical appliance.
6. Double earthing need to be provided for 3-phase power supply and for voltage more than 220V.
7. Provide lightening arrestors at the top of Boiler 3 and boiler 4 and rest sheds which are not covered by existing lightening arrestor of other installation.

C. Others:

1. Maintain smooth flow on open drains. i.e. no obstruction or blockade shall be made on storm water drains. If required, make temporary drains.
2. Arrange back-filling of excavated pits on war-footing basis.
3. Arrange bringing down booms of all cranes, hydra machines during stormy weather (wind speed 40-50 kmph)
4. Confirm that all gantry cranes are effectively choked to prevent rolling and toppling.
5. Do not forget to deep ready a dew battery operated lights at site-offices during rainy season.
6. Avoid using wet damp clothes.
7. Barricade excavated zone filled with water.
8. Engage diesel operated water pump to dewater work area. For electrically operated water pump, the starter shall be protected from rain water. All rotating parts shall be guarded. Ensure availability of sufficient water pumps.

D. Health and hygiene:

1. Monsoon reduces the immunity of our body and makes us vulnerable to many diseases which are commonly associated with this season. It is time for us to keep our body challenging against disease by boosting our immunity and taking safety measures against these diseases.

2. The diseases associated with monsoon are Malaria, Jaundice, Gastro-intestinal infections, like typhoid, cholera etc. apart from these viral infections like cold and cough also make their presence felt. Majority of above said diseases are on account of:
3. Puddle of water formed due to rain become breeding grounds for mosquitoes which spread disease like, malaria and dengue fever. As a precautionary measure against mosquito-bite disease one can use mosquito net around the end which is better choice to mosquito repellants like mats and coils.
4. Pollution of drinking water during monsoon is very common. It is very necessary to drink clean and pure water when water-borne monsoon diseases like diarrhea and gastro-intestinal infections threaten us.
5. Walking in dirty water during rainy season leads of numerous fungal infection which affect toes and nails. Diabetic patients have to take a special care about their feet. Keeping feet always dry and clean is very necessary. Avoid walking in dirty water. Keep shoes socks and raincoats dry and clean.

E. Workmen will be made aware of following Do's and Don'ts:

1. Do not sleep in daytime.
2. Avoid over physical exertion.
3. During lightning and thunder storm, do not take shelter under tree. Take shelter inside rest shed or store room.
4. Wash vegetables with clean water and steam them well to kill germs.
5. Avoid eating un-cooked foods and salads should be washed properly before consumption.
6. Drink plenty of water and keep body well-hydrated.
7. Always keep the surrounding area dry and clean. Don't allow to get water accumulated around.
8. Keep body warm as viruses attack immediately when body temperature goes down.
9. Do not enter air conditioned room with wet hair and damp cloths.
10. Dry your feet and webs with soft dry cloth whenever they are wet.
11. Eat light and less spicy food.
12. Avoid eating food which was cooked long time ago.
13. Eat salt in food to replenish loss of salt through sweating.

13.2.12.3 Emergency Weather Conditions

A. Cyclone/Severe thunder storm

In the event of Cyclone/Severe thunder storm, alert will be issued by subcontractor on notification received by Govt. authorities/Metrological departments Customer or BHEL.

The actions required during cyclone/rough weather:

1. Check and advice subcontractors to cleanup work area. Pick up all loose and unused material of respective supervisor's area.
2. Tie to secure all gas cylinders to avoid displacement and unsafe conditions which could be due to wind pressure.

3. Secure portable electricity generating sets and other equipment, pumps, hoses etc.
4. Make preparation for removal of water logging.
5. Take review of work activity and make preparation for removal of equipment and material from vulnerable areas.
6. Isolate/turn off all electrical power form the main panel/switches. Secure and anchor panels properly.
7. Recheck anchorage/tie of all temporary structures/sheds, tall objects, cranes, rigs, scaffolds etc. to avoid toppling due to wind force.
8. Cranes boom shall be secured, either locked or lowered the booms as reasonably and practicably possible and rigs to safe position for the safety point of view.
9. Group up all trash barrels, wooden pallets, forms; wooden decks etc. and anchor properly.
10. Welding machines, air compressors and such equipment are to be grouped together and secured to the stable objects. Welding leads, electrical cables, hoses are to be rolled up and secured properly.
11. Set on site vehicles on high ground in the site area with brakes set firmly.
12. Anchor all tanks, vessels, gas cylinders that may be moved by high wind and water.
13. Evacuate job site.

Personnel Evacuation:

14. Personnel Evacuation will be required if predicted wind speed and storm surge heights are beyond acceptable limits as per the instructions from Govt. Authorities/ Metrological departments or Customer.
15. Once the warning is received for personnel evacuation, an emergency response team shall be formed. The team will work with local authorities and other agencies formed/deployed to evacuate and transport all personnel involved in the project to the cyclone shelter.
16. Cyclone may be followed by the calm “EYE”, be aware of it. If the wind suddenly drops, don’t assume the cyclone is over. Violent wind may resume from the opposite side direction. Wait for the official “All clear Signal”.
17. After the cyclone, do not go outside until officially communicated about safe situation outside. Use recommended routes for returning. Do not panic or rush while returning.
18. Checking of gas leaks and well being of electrical appliances is essential before leaving the site.
19. Follow local communications for official warning and advice. The construction Manager shall also obtain updates from customer/metrological departments and communicate to the personnel on project site.

13.2.12.4 Preparedness for Other Adverse Climates and Weather Conditions

All Preventive and Precautionary measures to ensure Health & Safety of workers in all possible adverse weather conditions based on the analysis of the local area conditions to be taken by the subcontractor

13.3 ENVIRONMENTAL CONTROL

1. Environment protection has always been given prime importance by BHEL. Environmental

damage is a major concern of the principal subcontractor and every effort shall be made, to have effective control measures in place to avoid pollution of Air, Water and Land and associated life.

2. Subcontractor shall list out all applicable environmental aspects and impacts, and ensure control measures to manage the same.
3. Chlorofluorocarbons such as carbon tetrachloride and trichloroethylene shall not be used.
4. Waste disposal shall be done in accordance with the guidelines laid down in the project specification.
5. Any chemical including solvents and paints, required for construction shall be stored in designated bonded areas around the site as per MSDS.
6. In the event of any spillage, the principle is to recover as much material as possible before it enters drainage system and to take all possible action to prevent spilled materials from running off the site. Subcontractor shall use appropriate MSDS for clean-up technique. Subcontractor shall be responsible for the cleanliness of their own areas.
7. Subcontractor shall ensure that noise levels generated by plant or machinery are as low as reasonably practicable. Where the subcontractor anticipates the generation of excessive noise levels from his operations the subcontractor shall inform BHEL accordingly so that reasonable & practicable precautions can be taken to protect other persons who may be affected.
8. It is imperative on the part of the subcontractor to join and effectively contribute to environmental protection measures such as tree plantation and towards social causes and maintaining good relations with local populace.
9. The subcontractor shall carry out periodic air and water quality check and illumination level checking in respective area of work place and take suitable control measure to maintain the same as per applicable laws / standards

13.3.1 WASTE MANAGEMENT

1. Subcontractor shall take suitable measures for waste management and fulfilling requirements of environment related laws/legislation as a part of normal construction activities.
2. Compliance with the legal requirements on storage/ disposal of paint drums (including the empty ones), Lubricant containers, Chemical Containers, and transportation and storage of hazardous chemicals will be strictly maintained.
3. Details of E-Waste, Hazardous Waste, shall be submitted to BHEL as per Format No. HSEP: 14-F18 and HSEP: 14-F19 respectively

13.3.1.1 BINS AT WORK PLACE

1. Sufficient rubbish bins shall be provided close to workplaces.
2. Bins should be painted yellow and numbered.
3. Sufficient nos. of drip trays shall be provided to collect oil and grease.
4. Sufficient qty. of broomsticks with handle shall be provided.
5. Adequate strength of employees should be deployed to ensure daily monitoring and service for waste management.

13.3.1.2 STORAGE AND COLLECTION

1. Different types of rubbish/waste should be collected and stored separately.

2. Paper, oily rags, smoking material, flammable, metal pieces should be collected in separate bins with close fitting lids.
3. Rubbish should not be left or allowed to accumulate on construction and other work places.
4. Do not burn construction rubbish near working site.

13.3.1.3 SEGREGATION

1. Earmark the scrap area for different types of waste.
2. Store wastes away from building.
3. Oil spill absorbed by non-combustible absorbent should be kept in separate bin.
4. Clinical and first aid waste stored and incinerated separately.

13.3.1.4 DISPOSAL

1. Sufficient containers and scrap disposal area should be allocated.
2. All scrap bin and containers should be conveniently located.
3. Provide self-closing containers for flammable/spontaneously combustible material.
4. Keep drainage channels free from choking.
5. Make schedule for collection and disposal of waste.

13.3.1.5 WARNING AND SIGNS

1. Appropriate signage to be displayed at scrap storage area
2. No toxic, corrosive or flammable substance to be discarded into public sewage system.
3. Waste disposal shall be in accordance with best practice.
4. Comply with all the requirements of Pollution Control Board (PCB) for storage and disposal of hazardous waste.

13.4 HOUSEKEEPING

1. Keeping the work area clean/ free from debris, removing unused scaffoldings, scraps, insulation/ sheeting wastage /cut pieces temporary structures, packing woods etc. will be in the scope of the subcontractor.
2. Such cleaning has to be done by subcontractor within quoted rate, on daily basis by dedicated identified groups equipped with all require PPEs and training. The details of housekeeping group shall be provided to BHEL.
3. If such activity is not carried out by subcontractor / BHEL is not satisfied, then BHEL may get it done by other agency and actual cost along with BHEL overheads will be deducted from subcontractor's bill. Such decisions of BHEL shall be binding on the subcontractor.
4. Pests, such as beehives etc. shall be periodically removed in a humane fashion
5. **Following are to be taken care of on daily basis.**

i. All surplus earth and debris are removed/disposed of from the working areas to identified locations.
ii. Unused/Surplus cables, steel items and steel scrap lying scattered at different places /elevation within the working areas are removed to identify locations.
iii. All wooden scrap, empty wooden cable drums and other combustible packing materials, shall

be removed from workplace to identified locations. Sufficient waste bins shall be provided at different work places for easy collection of scrap/waste. Scrap chute shall be installed to remove scrap from high locations

iv. Access and egress (stair case, gangways, ladders etc.) path should be free from all scrap and other hindrances.
v. Workmen shall be educated through tool box talk about the importance of housekeeping and encourage not to litter.
vi. Labor camp area shall be kept clear and materials like pipes, steel, sand, concrete, chips and bricks, etc. shall not be allowed in the camp to obstruct free movement of men and machineries.
vii. Fabricated steel structures, pipes & piping materials shall be stacked properly.
viii. No parking of trucks/trolleys, cranes and trailers etc. shall be allowed in the camp, which may obstruct the traffic movement as well as below LT/HT power line.
ix. Utmost care shall be taken to ensure over all cleanliness and proper upkeep of the working areas

13.5 TRAFFIC MANAGEMENT

13.5.1 SAFE WORKPLACE TRANSPORT SYSTEM

1. Traffic routes in a work place shall be suitable for the persons or vehicles using them.
2. Traffic routes for pedestrians and vehicles shall be clearly demarcated and indicated
3. Traffic routes shall never intersect the area of work and shall not endanger the site personnel
4. For internal traffic, lines marked on roads / access routes and between buildings shall clearly indicate where vehicles are to pass.
5. Temporary obstacles shall be brought to the attention of drivers by warning signs / hazard cones.
6. Power cables shall be maintained at a minimum height above ground as specified in Indian Electricity Act & Rules.
7. Sensible speed limits shall set and clearly displayed. Painted Speed ramps preceded by a warning signs or marker are necessary for stretches of roads exceeding 50 meters.
8. The traffic route should be wide enough to allow vehicles to pass and re-pass oncoming or parked traffic and it may be advisable to introduce on-way system or parking restrictions.
9. Safest route shall be provided between places where vehicles have to call or deliver.
10. Avoid vulnerable areas/items such as fuel or chemicals tanks or pipes, open or unprotected edges and structures likely to collapse
11. Safe areas shall be provided for loading and unloading of material. Loading / Unloading Permit shall be taken from BHEL prior to any significant loading / unloading activity
12. Avoid sharp or blind bends. If this is not possible hazards should be indicated e.g. blind corner.
13. Ensure road crossings are minimum and clearly signed.
14. Entrance and gateways shall be wide enough to accommodate a second vehicle without causing obstruction.
15. Forklift trucks shall not pass over road hump unless of a type capable of doing so.

16. Overhead electric cable, pipes containing flammable hazardous chemical shall be shielded by using goal posts height gauge posts or barriers.
17. The height of Power cables above areas of movement shall conform to Indian Electricity Rules
18. Road traffic signs shall be provided on prominent locations for prevention of accidents and hazards and for quick guidance and warning to employees and public.
19. Safety signs shall be displayed as per the project working requirement and guideline of the state in which project is done.
20. Vehicles hired or used shall not be parked within the 15m radius of any working area. Any vehicle, that is required to be at the immediate/near the vicinity, shall be approved by the person in-charge of the site.

13.5.2 TRAFFIC ROUTE FOR PEDESTRIANS

1. Where traffic routes are used by both pedestrians and vehicles road shall be wide enough to allow vehicles and pedestrians safely.
2. Separate routes shall be provided for pedestrians to keep them away from vehicles. Provide suitable barriers/guard at entrances/exit and the corners or buildings.
3. Where pedestrian and vehicle routes cross, appropriate crossing shall be provided.
4. Where crowd is likely to use roadway e.g. at the end of shift, stop vehicles from using them at such times.
5. Provide high visibility clothing for people permitted in delivery area.

13.5.3 WORK VEHICLES

Work vehicles shall be as safe stable efficient and roadworthy as private vehicles on public roads. Subcontractors shall ensure that drivers are suitably trained and have valid license and experience for the designated class of vehicle. All vehicle e.g. heavy motor vehicle forklift trucks dump trucks mobile cranes shall ensure that the work equipment conforms to the following:

1. A high level of stability.
2. A safe means of access/egress.
3. Suitable and effective service and parking brakes.
4. Windscreens with wipers and external mirrors giving optimum all round visibility.
5. Provision of horn, vehicle lights, reflectors, reversing lights, reversing alarms.
6. Provision of seat belts.
7. Guards on dangerous parts.
8. Driver protection - to prevent injury from overturning and from falling objects/materials.
9. Driver protection from adverse weather.
10. No vehicle shall be parked below HT/LT power lines in conformance to Indian Electricity Act & Rules.
11. Valid Pollution Under Control certification for all vehicles

13.5.4 DAILY CHECKS BY DRIVER

There should also be daily safety checks containing below mentioned points by the driver before the vehicle is used. Subcontractors should ensure that drivers carry out these checks as a minimum.

Brakes	Mirrors	Warning signals
Tires	Windscreen waters	Specific safety system i.e. control interlocks
Steering	Wipers	

13.5.5 TRANSPORTATION OF PERSONNEL AND MATERIALS BY VEHICLES

1. All drivers shall hold a valid driving License for the class of vehicle to be driven and be registered as an authorized BHEL driver with the Administration Department.
2. Securing of the load shall be by established and approved methods, i.e. chains with patented tightening equipment for steel/heavy loads. Sharp corners on loads shall be avoided when employing ropes for securing.
3. All overhangs shall be made clearly visible and restricted to acceptable limits
4. Load shall be checked before moving off and after traveling a suitable distance.
5. On no account is construction site to be blocked by parked vehicles Drivers of vehicles shall only stop or park in the areas designate by the stringing foreman.
6. Warning signs shall be displayed during transportation of material.
7. All vehicles used by Subcontractor shall be in worthy condition and in conformance to the Land Transport requirement

13.5.6 MAINTENANCE

All Vehicles used for transportation of man and material shall undergo scheduled inspections on frequent intervals to secure safe operation. Such inspections shall be conducted in particular for steering, brakes, lights, horn, doors etc. Site management shall ensure that work equipment is maintained in an efficient, working order and in good repair. Inspections and services carried out at regular intervals of time and or mileage. No maintenance shall be carried below HT/LT power lines.

13.6 EMERGENCY PREPAREDNESS AND RESPONSE

1. Subcontractor shall develop Emergency preparedness and response capability and Emergency Response Team as per HSEP06: HSE Procedure for Emergency Preparedness and Response
2. Availability of adequate number of first aiders and fire warden shall be ensured
3. All the subcontractor's supervisory personnel and sufficient number of workers shall be trained for fire protection systems. Enough number of such trained personnel must be available during the tenure of contract. Subcontractor should nominate his supervisor to coordinate and implement the safety measures and communicate the same to BHEL.
4. Assembly point shall be earmarked and access to the same from different location shall be shown
5. Fire exit shall be identified and pathway shall be clear for emergency escape.
6. Appropriate type and number of fire extinguisher shall be deployed as per Clause No. 13.2.11 and validity shall be ensured periodically through inspection
7. Adequate number of first aid boxes shall be strategically placed at different work places to cater

to all emergency needs. Holder of the first aid box shall be identified on the box itself who will have the responsibility to maintain the same.

8. First aid center shall be developed at site with trained medical personnel and ambulance
9. Emergency contact numbers of the site shall be displayed at prominent locations.
10. Tie up with fire brigade shall be done in case customer is not having fire station.

11. Tie up with hospital shall be ensured in order to ensure the availability of following services to victims quickly without wasting precious time:
    a. Intensive Care Unit with Ventilator and other necessary life support systems
    b. Facility of specialized Orthopedic Surgery – in case of fracture / amputation
    c. Facility of specialized brain / neuro surgery – in case of head trauma
    d. Facility of specialized burn unit / ward – in case of Fire / burn injury
    e. and other facilities as per requirement at site location

    In case tie up with multiple hospitals is required to cover all possible accidents, same shall be done. The list of facilities to be regularly checked and updated.
12. A detailed emergency services (Fire / Medical etc.) tie up plan shall be submitted to BHEL in monthly report Format No. HSEP:14-F05
13. Mock drill shall be conducted on different emergencies periodically to find out gaps in emergency preparedness and taking necessary corrective action

14 HSE INSPECTION

Inspection on HSE for different activities being carried out at site shall be done to ensure compliance to HSEMS requirements. The subcontractor shall maintain necessary safety equipment as applicable, to enable inspection personnel/agency perform Inspection. If any test equipment is found not complying with proper safety requirements then the Inspection Agency may withhold inspection, till such time the desired safety requirements are met.

The requirements of respective work permits are to be ensured by respective supervisors, safety personnel and area in-charges. In addition, the formats & checklists as per Clause 21 of this document provided by BHEL shall be used for inspection by Safety personnel (as a minimum), and records of inspection to be maintained. BHEL shall reserve the right to modify any Format in this document or introduce additional checklists / formats to ensure regular inspection of all equipment as per requirement.

14.1 DAILY HSE CHECKS

Both the Site Supervisors and HSE Supervisors are to conduct daily site Safety inspection around work activities and premises to ensure that work methods and the sites are maintained to an acceptable standard. The following are to form the common subjects of a daily safety inspection:

1. **Height Work:**
   a. Safe, barricaded platform
   b. PPEs
   c. Proper method
   d. Awareness
2. Personal Safety wears & gear compliance.
3. Complying with site safety rules and permit-to-work (PTW).
4. Positions and postures of workers.
5. Use of tools and equipment etc. by the workers.
6. The inspection shall be carried out just when work starts in beginning of the day, during peak activities period of the day and just before the day's work ends.

14.2 INSPECTION OF HEIGHT WORKING

1. Any kind of height work (above 2 meters) shall not be carried out without active physical supervision by concerned supervisor or safety personnel. All non-conformances related to height work shall be handled on priority and closed immediately after halting the work.
2. A roster of personnel deployed for inspection of height work and other critical activities shall be prepared and submitted to BHEL in monthly report Format No. HSEP:14-F05, in order to ensure effective supervision at all times
3. Inspection on height working shall be conducted **daily** by supervisors before start of work to ensure safe working condition including provision of:

a. Fall arrestor b. Lifelines c. Safety nets	d. Fencing and barricading e. Warning signage f. Covering of opening	g. Proper scaffolding with valid Tags, access and egress. h. Illumination

4. Inspection on height working shall be conducted once in a week by HSE officer as per
5. Format no. HSEP: 14-F10.
6. Medical fitness, including vertigo test of height worker shall be ensured.
7. Height working shall not be allowed during adverse weather.

14.3 INSPECTION OF PPE

PPEs shall be inspected by HSE officer at random once in a week as per Format no. HSEP: 14-F06 for compliance to standard and provisions and any adverse observation shall be recorded in the PPE register.

14.4 INSPECTION OF T&Ps

1. All T& Ps being used at site shall be inspected by HSE officer once in a month as per specific Formats in this document, or (if not available) general Format no. HSEP: 14-F07 for its healthiness and maintenance.
2. A master list of T&Ps and validity of their inspection certificates shall be maintained by each agency and details shall be submitted to BHEL in monthly format no. HSEP:14-F05.
3. The T&Ps which require third party inspection shall be checked for its validity during inspection.

The third party test certificate should be accompanied with a copy of the concerned competent person's valid qualification record. BHEL shall be given advance intimation of Third Party Inspection. BHEL shall associate with Inspection as per discretion.

14.5 INSPECTION OF CRANES AND WINCHES

1. Cranes and winches shall be inspected by the operator through a daily checklist for its safe condition (as provided by the equipment manufacturer) before first use of the day.
2. Cranes and Winches shall be inspected by HSE officer once in a month as per Format no. HSEP: 14-F08 & F09 for healthiness, maintenance and validity of third party inspection.
3. The date of third party inspection and next due date shall be painted on cranes and winches.
4. The operators/drivers shall be authorized by sub-contractor based on their competency and experience and shall carry the I-card.
5. The operator should be above 18 years of age and should be in possession of driving license of HMV man & goods), vision test certificate and should have minimum qualification so that he can read the instructions and check list.

14.6 INSPECTION ON WELDING AND GAS CUTTING OPERATION

1. Supervisor shall ensure that no flammable items are available in near vicinity during welding and gas cutting activity.
2. Gas cylinders shall be kept upright.
3. Use of Flash back arrestor shall be ensured at both ends.
4. Inspection during welding and gas cutting operations shall be carried out by HSE officer once a month as per Format no. HSEP: 14-F11.
5. Use of fire blanket to be ensured to avoid falling of splatters during welding or gas cutting operation at height.
6. Availability of fire extinguisher in vicinity shall be ensured.

14.7 INSPECTION ON ELECTRICAL INSTALLATION / APPLIANCES

1. Ensure proper earthing in electrical installation
2. Use of ELCB at electrical booth
3. Electrical installation shall be properly covered at top where required
4. Use appropriate PPEs while working
5. Use portable electrical light < 24 V in confined space and potentially wet area.
6. Monthly inspection shall be carried out as per Format no. HSEP: 14-F12.

14.8 INSPECTION OF ELEVATOR

1. Elevators shall be inspected by concerned supervisors once in a week as per Format no. HSEP: 14-F13.
2. All elevators shall be inspected by competent person and validity shall be ensured.
3. The date of third party inspection and next due date shall be painted on elevator.

14.9 MONTHLY SITE INSPECTION

Subcontractor shall carry out monthly HSE inspection of all work areas as per Format No. HSEP:14-F20 and submit to BHEL

14.10 NON-CONFORMITY HANDLING:

Any serious non-conformances identified during inspection observed shall be addressed immediately.

In case immediate closure of non-conformities is not possible:

a. work to be halted in the area
b. Non-conformance to be generated and submitted to responsible person and BHEL
c. non-conformance to be resolved through responsible agency / person
   Only after closure of serious non-conformances, work to be allowed to resume.

All non-conformances & safety violations to be recorded and closed in a time bound manner.

15 HSE PERFORMANCE

HSE performance of subcontractor shall be monitored as per BHEL criteria, based on which, marks will be awarded. Marks can be used to evaluate and rate the contractor as per BHEL internal systems. Format for vendor HSE performance evaluation is attached in annexure (Format No. HSEP:14-F33)

Subcontractor shall make available all data required for evaluation to BHEL as and when demanded.

1. If safety record of the subcontractor in execution of the awarded job is to the satisfaction of safety department of BHEL, issue of an appropriate certificate to recognize the safety performance of the subcontractor may be considered by BHEL after completion of the job.

2. 1.5% of running bill shall be cleared subject to certification of desired safety performance by BHEL

16 HSE PENALTIES FOR NON-COMPLIANCE

1. Nonconformity of safety rules and safety appliances will be viewed seriously and BHEL has right to impose fines on the subcontractor for every instance of violation noticed.

2. The applicable penalties for HSE violations are given in Format No. HSEP14-F14 of this document

3. The list of non-compliances given in above format is not exhaustive. The BHEL site in-charge has liberty to impose a penalty for any other non-compliance and incidents of any nature.

4. If principal customer or statutory and regulatory bodies impose penalty on ground of statutory non-compliance or non-compliance of HSE rules by the subcontractor or any incident of any nature including fatality or permanent disability, the same shall be passed on to the subcontractor with appropriate overhead

5. The penalty amount shall be recovered from subcontractors from the RA Bill, otherwise Final bill.

17 COMPENSATION TO ACCIDENT VICTIMS

1. 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.

b. **Victim**: Any person who suffers permanent disablement or dies in an accident as defined below.

c. **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.

d. 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. (ii) In the event of other permanent disability: Rs. 7,00,0001- (Rs. Seven Lakh)

e. **Permanent Disability**: 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. In addition to above, contractor shall provide appropriate compensation to victims of major and fatal incidents as per Employee Compensation Act, 1923, ESIC Act, 1948 or as per any existing Acts and guidelines

18 INTERNAL & EXTERNAL HSE AUDITS

1. Subcontractor shall extend full co-operation and maintain necessary documents & records as required by Internal & External HSE Audit carried out by BHEL. / Third Party
2. All non-conformities and observations on HSE shall be disposed of-by subcontractor in a time bound manner as detailed in Audit Report.
3. All required corrective actions shall be taken by the subcontractor in order to avoid recurrence

19 OTHER REQUIREMENTS

1. In case of any delay in completion of a job due to mishaps attributable to lapses by the subcontractor, BHEL shall have the right to recover cost of such delay from the payments due to the subcontractor, after holding an appropriate enquiry and notifying the subcontractor suitably.

2. **RISK & COST:**

   If the subcontractor fails to improve the standards of safety in its operation to the satisfaction of BHEL after being given reasonable opportunity to do so and/or if the subcontractor fails to take appropriate safety precautions or to provide necessary safety devices and equipment or to carry out instruction regarding safety as per contractual requirements, BHEL shall have the right to take corrective steps at the risk and cost of the subcontractor after giving a notice of not less than 7 days indicating the steps that would be taken by BHEL.

3. If the subcontractor succeeds in carrying out its job in time without any fatal or disabling injury incident and without any damage to property BHEL may, at its sole discretion, favourably consider to reward the subcontractor suitably for the performance.

4. The subcontractor shall take all measures at all the sites of work to protect all persons from incidents and shall be bound to bear the expenses of every suit, action or other proceeding of law that may be brought by any persons for injury sustained, death or damage to environment

owing to neglect of the HSE precautions by the subcontractor; and shall be liable to pay any such persons such compensation, should such claim proceeding be filed against BHEL.

The subcontractor hereby agrees to indemnify BHEL against the same.

20 HSE REVIEW

BHEL shall hold HSE review meeting every month or as per requirement in order to discuss and resolve HSE issues of site and improve HSE performance. It will also discuss the incidents occurred since previous meeting, its root cause and Corrective action. The indicative agenda is given below:

1. Implementation of earlier MOM
2. HSE performance review
3. HSE inspection review w.r.t non-conformances observed and their status
4. HSE audit and CAPA
5. HSE training conducted and requirement
6. Health check-up camp
7. HSE planning for the erection and commissioning and installation activities in the coming month
8. HSE reward and promotional activities
9. HSE data analysis and improvement – Data analyzed will include non-conformances closed and pending, incident data, training data etc.

Subcontractor shall ensure presence of site in-charge, all package in-charges and safety officers, as communicated by BHEL in the meeting.

Subcontractor shall take requisite actions as per record notes and as decided in the meeting, in a time bound manner and submit compliance report to BHEL.

21 FORMATS USED

This is minimum list of Formats to be used for reporting by the subcontractor. Other Formats are indicated in respective HSE Procedures, Work Permits, OCPs or as specified by BHEL. The medium of reporting can be hard / soft as indicated by BHEL.

BHEL can modify these Formats or introduce new Formats to the extent necessary to get the desired performance data of all HSE activities.

SN	Format Name	Format No.	Frequency of check	Rev
1	Work at Height Permit	HSEP:14-FP01	Before start of work and regularly thereafter as per Permit conditions	00
2	Hot Work Permit	HSEP:14-FP02		00
3	Confined Space Work Permit	HSEP:14-FP03		00
4	Excavation Work Permit	HSEP:14-FP04		00
5	Radiation Work Permit	HSEP:14-FP05		00
6	Lifting Activity Work Permit	HSEP:14-FP06		00
7	Lockout-Tagout Work Permit	HSEP:14-FP07		00
8	Inspection of First Aid Box	HSEP:14-F01	Weekly	00
9	Health Check Up	HSEP:14-F02	With new Induction & as per requirement thereafter	00
10	HSE Induction / Regular / On-the-Job Training	HSEP:14-F03	With new Induction & as per requirement thereafter	00
11	Tool Box Talk	HSEP:14-F04	Daily before job start	00
12	Site HSE Report	HSEP:14-F05	Monthly	00
13	PPE Inspection	HSEP:14-F06	Weekly	00
14	PPE Issue and Receipt	HSEP:14-F06A	With new Induction	
15	Inspection of T&Ps (General)	HSEP:14-F07	Monthly / As per requirement	00
16	Inspection of Cranes	HSEP:14-F08	Monthly / As per requirement	00
17	Inspection of Winches	HSEP:14-F09	Monthly / As per requirement	00
18	Inspection of Height Working	HSEP:14-F10	Daily / As per requirement	00
19	Inspection on Welding & Gas Cutting	HSEP:14-F11	Weekly / As per requirement	00
20	Inspection on Electrical Installation	HSEP:14-F12	Weekly / As per requirement	00
21	Inspection on Elevator	HSEP:14-F13	Weekly / As per requirement	00
22	HSE Penalty	HSEP:14-F14	-	00
23	Initial Verification of PPE's & Lifting Tools & Tackles	HSEP:14-F15	As and when new PPEs and T&Ps are received	00
24	Inspection of Labor Colony	HSEP:14-F16	Monthly / as per requirement	00
25	Recording of First Aid Injuries	HSEP:14-F17	As and when such injuries occur	00
26	E-waste Handled / Generated	HSEP:14-F18	Half Yearly	00
27	Hazardous Waste at the Facility	HSEP:14-F19	Half Yearly	00
28	HSE Checklist-cum-Compliance Report	HSEP:14-F20	As per Audit Calendar	00
29	Illumination Levels	HSEP:14-F21	Weekly / As per requirement	00
30	Incident Reporting	HSEP:14-F22	-	00
31	Incident Recording	HSEP:14-F23	-	00
32	Monthly HSE Planning & Review	HSEP:14-F30	Monthly	00
33	Daily HSE Reporting	HSEP:14-F31A	Daily	00
34	Job Safety Analysis	HSEP:14-F32B	Before starting new job	00
35	Evaluation of HSE Performance	HSEP:14-F33	Monthly	00

HSEP:14-FP01

WORK AT HEIGHT PERMIT	Permit No. & Date
Project & Unit:	Emergency Contact Nos:
BHEL Sub-contractor:	

Exact Location of Work:_____

Nature / Description of Work:_____

Duration of Work Execution *: From Date:_____to Date:_____Daily from _____ hrs. to _____hrs.

Name of Sub-Contractor Performing the Work: _____

Name of Sub-Contractor's Site Engineer (Permit Requesting Authority):_____Sign:_____

Name of Sub-Contractor's Package In-charge:_____Sign:_____Date:_____

The above described work will be done under all the safety precautions mentioned as under during the currency of the Permit.

No.	Item	Yes	Not required / Remarks
1	All workers on job are competent and medically fit (No Height Phobia) for working at height		
2	Hazards in the vicinity are identified, controlled and communicated to the worker.		
3	Scaffolding soundness inspected is available for use with valid tag		
4	Work platform is not made of bamboo or weak material. Barricading is available with Top, Mid Rails and Toe Guard.		
5	Working platform is clean without any unwanted material. Floor openings are covered.		
6	Access and exit to workplace are safe, marked and without obstruction.		
7	Adequate lighting provided (for dark hours) as per applicable lux standards (Refer HSEP:13)		
8	Safety nets are provided below working area.		
9	Area below the working platform has been cleared of all activity		
10	Ladders have been secured, inspected and provided as per BHEL standard/contract.		
11	Horizontal life lines are provided to cater to design specification of 2300 kg per person.		
12	Safety harness with life line support/ fall arrester are checked and available in working condition		
13	Safety shoes (non-slip), Helmet with chin strip available with employees		
14	Visible Signboards provided on working platforms in workers' understandable language		
15	All lifting / tightening tools, hand tools/equipment checked and in good condition		
16	ELCB provided for Electrical connections individually. Electrical cable, welding Hose/Compressed air hose properly secured and laid down without obstruction. Earth resistance is OK.		
17	Crane / Winch / Hydra operator is qualified and experienced		
18	Emergency response team & Medical Facilities available. Work area is cordoned off.		
19	Job Safety Analysis Submitted		
20	Additional Permits to be taken (Please specify & attach):		

Declaration: ***All the points mentioned in the above checklist have been checked and found OK***

Permit Receiver:

Site Engineer (Sub- Contractor):		Site Safety Officer (Sub-Contractor):	
Signature:		Signature:	
Name:	Designation:	Name:	Designation:

Permit Issuer:

Engineer of Concerned Execution Department (BHEL):		Site Safety Officer (BHEL):	
Signature:		Signature:	
Name:	Designation:	Name:	Designation:

Package-in-charge (BHEL):	
Signature:	
Name:	Designation:

Verified by Customer Representative (if applicable), Name: _____ ***Sign:*** _____ ***Date:*** _____ ***Time:*** _____

(* Permit valid for 7 days, subject to daily renewal, and extension as per overleaf instructions / record formats)

Work at Height Permit No. & Date: _____

Daily Work Area Condition Endorsement

Sl. No.	Date	Signature with Date & Time		Remarks
		Agency Safety	BHEL Safety	
Day 2				
Day 3				
Day 4				
Day 5				
Day 6				
Day 7				

Permit Extension Beyond Initially Requested Hours

Sl. No.	Extension Period		Remarks	Signature with Date & Time			
	From……. (Date & Time)	To…… (Date &Time)		Agency Site Engineer	Agency Safety Officer	BHEL Site Engineer (PIA)	BHEL Safety Officer
1.							
2.							
3.							
4.							
5.							
6							

TO BE SIGNED BY THE BHEL HSE & EXECUTION AFTER THE WORK IS OVER	
Permit is here by returned after completing the job & ensuring safe removal of men and material.	
Site Engineer, BHEL	**Site HSE Engineer, BHEL**
Signature:	Signature:
Name:	Name:

General Instructions:

1	This Permit is required for working at height of 2 mtr. and above or above excavation of 2 mtr or deeper.
2	This permit must be available at the work site all the times of the work.
3	Location and description of the work must be clearly indicated by the permittee.
4	Terms applicable must be clearly indicated by the permittee.
5	This permit shall be endorsed each day only after checking all the compliance jointly by the contractor and BHEL safety.
6	Permit shall be issued for not more than **7 days** including the issue date.
7	Permit shall be returned to the HSE Department of BHEL after completion of the job.
8	Before engaging anybody to work at height, height phobia needs to be ascertained and proper fitness certificate to be ensured.
9	All safety precautions to be taken as per work site HSE plan.
10	**Distribution of copy:**
	Original- Permittee, Duplicate –Department HOS, Contractor, Triplicate - Site HSE Dept.,

To be printed on both sides of an A4 Sheet

HSEP:14-FP02

HOT WORK PERMIT	Permit No. & Date
Project & Unit:	Emergency Contact Nos:
BHEL Sub-contractor:	

Exact Location of Work: _____

Nature / Description of Work: _____

Duration of Work Execution *: From Date: _____ to Date: _____ Daily from _____ hrs. to _____ hrs.

Name of Sub-Contractor Performing the Work: _____

Name of Sub-Contractor's Site Engineer (Permit Requesting Authority): _____ Sign: _____

Name of Sub-Contractor's Package In-charge: _____ Sign: _____ Date: _____

The above described work will be done under all the safety precautions mentioned as under during the currency of the Permit.

No.	Item	Yes	Not required / Remarks
1.	Welder is trained and qualified with good attendance in on-the-job training		
2.	Area ensured safe and free from all hazards (explosives etc.) with barricading and safe inlet / exit		
3.	Proper ventilation and lighting provided (in case of dark hours).		
4.	Gas hoses are in good condition and not cut / leaking		
5.	Pressure gauges/Flash back arrestor (at both ends) provided and in working condition.		
6.	Gas pressure in cylinder is within limits and hydraulic test certificate is available		
7.	Gas cylinders are stacked vertically and not below the welding / cutting area. Regulator key is available with cylinder. Gas cylinders covered with shields to prevent falling splinters.		
8.	Power supply to welding machine is through ELCB of 30 mA rating, which is tested and found ok; Earthing is tested and found OK		
9.	Welding machine input/output cables, welding holder and weld return clamp (Holder) are insulated and in good condition.		
10.	In case of welding in enclosed / confined spaces, the integrity of the structure and supports are ensured, Gas Testing done and evacuation system ensured in place		
11.	Emergency STOP buttons are in working condition. Welder /Helper knows how to operate it.		
12.	Welder & Fitter trained to connect ground/work return clamps (Holder) to work place prior to energization of welding machine.		
13.	Personal Protective equipment Minimum applicable: safety helmet, safety goggles, welding helmet, safety (rubber) shoes, leather gloves, long sleeve and nose mask -provided		
14.	In case of pits, water removed from the pit and wood/rubber insulation provided.		
15.	Safety signboards / cautions are in place.		
16.	Adequate and Suitable nos. of applicable firefighting extinguisher provided.		
17.	Nearby combustible material removed. Housekeeping done.		
18.	All workers explained about the hazards		
19.	First aid in attendance.		
20.	Any other Precautions or Permits required (Height Work, Confined Space etc.), give details and attach		

Declaration: ***All the points mentioned in the above checklist have been checked and found OK***

Permit Receiver:

Site Engineer (Sub- Contractor):		Site Safety Officer (Sub-Contractor):	
Signature:		Signature:	
Name:	Designation:	Name:	Designation:

Permit Issuer:

Engineer of Concerned Execution Department (BHEL):		Site Safety Officer (BHEL):	
Signature:		Signature:	
Name:	Designation:	Name:	Designation:

Package-in-charge (BHEL):	
Signature:	
Name:	Designation:

Verified by Customer Representative (if applicable), Name: _____ ***Sign:*** _____ ***Date:*** _____ ***Time:*** _____

(* Permit valid for 7 days, subject to daily renewal, and extension as per overleaf instructions / record formats)

Hot Work Permit No. & Date: _____

Daily Work Area Condition Endorsement

Sl. No.	Date	Signature with Date & Time		Remarks
		Agency Safety	BHEL Safety	
Day 2				
Day 3				
Day 4				
Day 5				
Day 6				
Day 7				

Permit Extension Beyond Initially Requested Hours

Sl. No.	Extension Period		Remarks	Signature with Date & Time			
	From……. (Date & Time)	To…… (Date &Time)		Agency Site Engineer	Agency Safety Officer	BHEL Site Engineer (PIA)	BHEL Safety Officer
1.							
2.							
3.							
4.							
5.							
6							

TO BE SIGNED BY THE BHEL HSE & EXECUTION AFTER THE WORK IS OVER

Permit is here by returned after completing the job & ensuring safe removal of men and material.

Site Engineer, BHEL	**Site HSE Engineer, BHEL**
Signature:	Signature:
Name:	Name:

General Instructions:

1	This Permit is required for all kinds of Hot Work eg. Welding, cutting etc..
2	This permit must be available at the work site all the times of the work.
3	Location and description of the work must be clearly indicated by the permittee.
4	Terms applicable must be clearly indicated by the permittee.
5	This permit shall be endorsed each day only after checking all the compliance jointly by the contractor and BHEL safety.
6	Permit shall be issued for not more than **7 days** including the issue date.
7	Permit shall be returned to the HSE Department of BHEL after completion of the job.
8	Before engaging anybody to work, competency and fitness to be ensured.
9	All safety precautions to be taken as per work site HSE plan.
10	**Distribution of copy:**
	Original- Permittee, Duplicate –Department HOS, Contractor, Triplicate - Site HSE Dept.,

HSEP:14-FP03

CONFINED SPACE WORK PERMIT	Permit No. & Date
Project & Unit:	Emergency Contact Nos:
BHEL Sub-contractor:	

Exact Location of Work:_____

Nature / Description of Work:_____

Duration of Work Execution *: From Date:_____to Date:_____Daily from _____ hrs. to _____hrs.

Name of Sub-Contractor Performing the Work: _____

Name of Sub-Contractor's Site Engineer (Permit Requesting Authority):_____Sign:_____

Name of Sub-Contractor's Package In-charge:_____Sign:_____Date:_____

The above described work will be done under all the safety precautions mentioned as under during the currency of the Permit.

No.	Item	Yes	Not required / Remarks
1.	Has the equipment been Isolated from Power/Steam/Air?		
2.	Has the equipment been Isolated from liquid or gases?		
3.	Has the equipment been de-pressurized &/or drained?		
4.	Has the equipment been Blanked/blinded or disconnected?		
5.	Has the equipment been water flushed &/or steamed?		
6.	Whether man ways open and ventilated?		
7.	Whether constant Inert gas flow arranged?		
8.	Whether mechanically ventilated and adequately cooled?		
9.	Whether 24 V lighting provided inside the confined space?		
10.	Whether Radiation sources removed?		
11.	Whether training on confined space provided to the individual / group?		
12.	Whether required PPEs (hand gloves, goggles, face shield, ear plug/muff, protective clothing etc.) used?		
13.	Whether Safety harness and Lifeline used?		
14.	Whether Dust/Gas/Air Line mask used?		
15.	Whether attendant with SCBA/Air mask available?		
16.	Whether grounded air Exhaust/Blower/ AC provided?		
17.	Whether Personal Gas alarm provided?		
18.	Whether communication Equipment Provided?		
19.	Whether rescue equipment/team available?		
20.	Whether firefighting arrangement done		
21.	Any other Precautions or Permits required (Height Work, Confined Space etc.), give details and attach		

Declaration: ***All the points mentioned in the above checklist have been checked and found OK***

Permit Receiver:

Site Engineer (Sub- Contractor):		Site Safety Officer (Sub-Contractor):	
Signature:		Signature:	
Name:	Designation:	Name:	Designation:

Permit Issuer:

Engineer of Concerned Execution Department (BHEL):		Site Safety Officer (BHEL):	
Signature:		Signature:	
Name:	Designation:	Name:	Designation:

Package-in-charge (BHEL):	
Signature:	
Name:	Designation:

Verified by Customer Representative (if applicable), Name: _____***Sign:*** _____***Date:*** _____***Time:*** _____

(* Permit valid for 7 days, subject to daily renewal, and extension as per overleaf instructions / record formats)

Confined Space Work Permit No. & Date: _____

Daily Work Area Condition Endorsement

Sl. No.	Date	Signature with Date & Time		Remarks
		Agency Safety	BHEL Safety	
Day 2				
Day 3				
Day 4				
Day 5				
Day 6				
Day 7				

Permit Extension Beyond Initially Requested Hours

Sl. No.	Extension Period		Remarks	Signature with Date & Time			
	From……. (Date & Time)	To…… (Date &Time)		Agency Site Engineer	Agency Safety Officer	BHEL Site Engineer (PIA)	BHEL Safety Officer
1.							
2.							
3.							
4.							
5.							
6							

TO BE SIGNED BY THE BHEL HSE & EXECUTION AFTER THE WORK IS OVER	
Permit is here by returned after completing the job & ensuring safe removal of men and material.	
Site Engineer, BHEL	**Site HSE Engineer, BHEL**
Signature:	Signature:
Name:	Name:

General Instructions:

1	This Permit is required for all confined space tasks, where injury can happen due to lack of oxygen, or chances of fire are there due to gas accumulation.
2	This permit must be available at the work site all the times of the work.
3	Location and description of the work must be clearly indicated by the permittee.
4	Terms applicable must be clearly indicated by the permittee.
5	This permit shall be endorsed each day after checking all the compliance jointly by the contractor and BHEL safety.
6	Permit shall be issued for not more than **7 days** including the issue date.
7	Permit shall be returned to the HSE Department of BHEL after completion of the job.
8	Before engaging anybody to work, competency and fitness to be ensured.
9	All safety precautions to be taken as per work site HSE plan.
10	**Distribution of copy:**
	Original- Permittee, Duplicate –Department HOS, Contractor, Triplicate - Site HSE Dept.,

HSEP:14-FP04

EXCAVATION WORK PERMIT	Permit No. & Date
Project & Unit:	Emergency Contact Nos:
BHEL Sub-contractor:	

Exact Location of Work: _____

Nature / Description of Work: _____

Duration of Work Execution *: From Date: _____ to Date: _____ Daily from _____ hrs. to _____ hrs.

Name of Sub-Contractor Performing the Work: _____

Name of Sub-Contractor's Site Engineer (Permit Requesting Authority): _____ Sign: _____

Name of Sub-Contractor's Package In-charge: _____ Sign: _____ Date: _____

The above described work will be done under all the safety precautions mentioned as under during the currency of the Permit.

No.	Item	Yes	Not required / Remarks
1	Precautions taken for Underground Electrical Cable		
2	Precautions taken for Under / Above ground sewer/Drinking Water Line		
3	Precautions taken for Underground Telecommunication Line		
4	Precautions taken for Underground Product/Utility Line		
5	Precautions taken for Underground Fire Water Line		
6	Shoring / Shuttering / Sheet piling done to prevent collapse of excavation walls. Strength of Excavation wall ensured at all times		
7	Hard Barricading & Edge Protection provided		
8	Separate Safe Access for Man and Vehicle		
9	Lighting arrangement		
10	Banks Man Provided		
11	Required basic PPEs provided		
12	Slope Cutting/Benching Maintained		
13	Excavated soil / Construction Material / equipment kept away from the edge.		
14	First aid in attendance.		
15	Any other Precautions or Permits required (Height Work, Confined Space etc.), give details and attach		

Declaration: ***All the points mentioned in the above checklist have been checked and found OK***

Permit Receiver:

Site Engineer (Sub- Contractor):		Site Safety Officer (Sub-Contractor):	
Signature:		Signature:	
Name:	Designation:	Name:	Designation:

Permit Issuer:

Engineer of Concerned Execution Department (BHEL):		Site Safety Officer (BHEL):	
Signature:		Signature:	
Name:	Designation:	Name:	Designation:

Package-in-charge (BHEL):	
Signature:	
Name:	Designation:

Verified by Customer Representative (if applicable), Name: _____ Sign: _____ Date: _____ Time: _____

(* Permit valid for 7 days, subject to daily renewal, and extension as per overleaf instructions / record formats)

Excavation Work Permit No. & Date: _____

Daily Work Area Condition Endorsement

Sl. No.	Date	Signature with Date & Time		Remarks
		Agency Safety	BHEL Safety	
Day 2				
Day 3				
Day 4				
Day 5				
Day 6				
Day 7				

Permit Extension Beyond Initially Requested Hours

Sl. No.	Extension Period		Remarks	Signature with Date & Time			
	From……. (Date & Time)	To…… (Date &Time)		Agency Site Engineer	Agency Safety Officer	BHEL Site Engineer (PIA)	BHEL Safety Officer
1.							
2.							
3.							
4.							
5.							
6							

TO BE SIGNED BY THE BHEL HSE & EXECUTION AFTER THE WORK IS OVER

Permit is here by returned after completing the job & ensuring safe removal of men and material.

Site Engineer, BHEL	**Site HSE Engineer, BHEL**
Signature:	Signature:
Name:	Name:

General Instructions:

1	This Permit is required for all excavation tasks 1.22 mtr or deeper
2	This permit must be available at the work site all the times of the work.
3	Location and description of the work must be clearly indicated by the permittee.
4	Terms applicable must be clearly indicated by the permittee.
5	This permit shall be endorsed each day after checking all the compliance jointly by the contractor and BHEL safety.
6	Permit shall be issued for not more than **7 days** including the issue date.
7	Permit shall be returned to the HSE Department of BHEL after completion of the job.
8	Before engaging anybody to work, competency and fitness to be ensured.
9	All safety precautions to be taken as per work site HSE plan.
10	**Distribution of copy:**
	Original- Permittee, Duplicate –Department HOS, Contractor, Triplicate - Site HSE Dept.,

HSEP:14-FP05

RADIATION WORK PERMIT	Permit No. & Date
Project & Unit:	Emergency Contact Nos:
BHEL Sub-contractor:	

Exact Location of Work:_____

Nature / Description of Work:_____

Duration of Work Execution *: From Date:_____to Date:_____Daily from _____ hrs. to _____hrs.

Name of Sub-Contractor Performing the Work: _____

Name of Sub-Contractor's Site Engineer (Permit Requesting Authority):_____Sign:_____

Name of Sub-Contractor's Package In-charge:_____Sign:_____Date:_____

The above described work will be done under all the safety precautions mentioned as under during the currency of the Permit.

No.	Item	Yes	Not required / Remarks
1.	All the persons at the site informed/removed from the area.		
2.	Area around the source of radiation cordoned off with the rope/chord.		
3.	Radiation warning symbol/boards displayed around radiography work on rope/chord.		
4.	Radiographer worn radiation badges during testing and is within safe limits.		
5.	Radiography camera and carrying case box having radiation symbol.		
6.	Radiation Survey Meter is in working condition, calibrated & within validity period.		
7.	Radiographer has valid certificate from BARC.		
8.	Blinking light provided on road during radiography (in dark hours).		
9.	Proper required Illumination provided		
10.	Safe access and working platform provided to conduct RT work		
11.	All the persons involved in Radiography work are aware of the hazard of radiation		
12.	Any other Precautions or Permits required (Height Work, Confined Space etc.), give details and attach		

Declaration: ***All the points mentioned in the above checklist have been checked and found OK***

Permit Receiver:

Site Engineer (Sub- Contractor):		Site Safety Officer (Sub-Contractor):	
Signature:		Signature:	
Name:	Designation:	Name:	Designation:

Permit Issuer:

Engineer of Concerned Execution Department (BHEL):		Site Safety Officer (BHEL):	
Signature:		Signature:	
Name:	Designation:	Name:	Designation:

Package-in-charge (BHEL):	
Signature:	
Name:	Designation:

Verified by Customer Representative (if applicable), Name: _____ ***Sign:*** _____ ***Date:*** _____ ***Time:*** _____

(* Permit valid for 7 days, subject to daily renewal, and extension as per overleaf instructions / record formats)

Radiation Work Permit No. & Date: _____

Daily Work Area Condition Endorsement

Sl. No.	Date	Signature with Date & Time		Remarks
		Agency Safety	BHEL Safety	
Day 2				
Day 3				
Day 4				
Day 5				
Day 6				
Day 7				

Permit Extension Beyond Initially Requested Hours

Sl. No.	Extension Period		Remarks	Signature with Date & Time			
	From……. (Date & Time)	To…… (Date &Time)		Agency Site Engineer	Agency Safety Officer	BHEL Site Engineer (PIA)	BHEL Safety Officer
1.							
2.							
3.							
4.							
5.							
6							

TO BE SIGNED BY THE BHEL HSE & EXECUTION AFTER THE WORK IS OVER

Permit is here by returned after completing the job & ensuring safe removal of men and material.

Site Engineer, BHEL	**Site HSE Engineer, BHEL**
Signature:	Signature:
Name:	Name:

General Instructions:

1	This Permit is required for all activities in which there is danger of exposure to harmful radiation
2	This permit must be available at the work site all the times of the work.
3	Location and description of the work must be clearly indicated by the permittee.
4	Terms applicable must be clearly indicated by the permittee.
5	This permit shall be endorsed each day after checking all the compliance jointly by the contractor and BHEL safety.
6	Permit shall be issued for not more than **7 days** including the issue date.
7	Permit shall be returned to the HSE Department of BHEL after completion of the job.
8	Before engaging anybody to work, competency and fitness to be ensured.
9	All safety precautions to be taken as per work site HSE plan.
10	**Distribution of copy:**
	Original- Permittee, Duplicate –Department HOS, Contractor, Triplicate - Site HSE Dept.,

HSEP:14-FP06

LIFTING ACTIVITY WORK PERMIT	Permit No. & Date
Project & Unit:	Emergency Contact Nos:
BHEL Sub-contractor:	

Exact Location of Work:_____

Nature / Description of Work:_____

Duration of Work Execution *: From Date:_____to Date:_____Daily from _____ hrs. to _____hrs.

Name of Sub-Contractor Performing the Work: _____

Name of Sub-Contractor's Site Engineer (Permit Requesting Authority):_____Sign:_____

Name of Sub-Contractor's Package In-charge:_____Sign:_____Date:_____

The above described work will be done under all the safety precautions mentioned as under during the currency of the Permit.

No.	Item	Yes	Not required / Remarks
1.	Crane used for lifting activity TPI tested, certified and approved for rated lifting		
2.	All lifting tackles, gears/appliances are tested and certified for lifting works.		
3.	Crane operator is trained and competent for lifting operation.		
4.	Lifting sling/ belt is protected against sharp edge of the jobs to be lifted.		
5.	Lifting hook is properly latched to prevent material falling over		
6.	Access and exit marked and without obstruction.		
7.	In case of lifting multiple materials at once, same are tied up with strong rope / material		
8.	Area below lifting activity barricaded to prevent movement		
9.	Minimum 2 guidelines have been provided for balancing and guiding jobs to be lifted.		
10.	Periphery area of crane booms as well as lifting job is barricaded and unauthorized/no-entry sign board posted.		
11.	Rigger and signal man is trained and competent for lifting work. Signal is clearly visible to the operator and understood		
12.	No lifting activity to be carried out during lightening, heavy wind/rain. No forecast of these conditions during work period		
13.	If scaffolding to be used during lift, scaffolding with valid tag available for use.		
14.	Add drawing /procedure etc. relevant for the lifting.		
15.	Any other Precautions or Permits required (Height Work, Confined Space etc.), give details and attach		

Declaration: ***All the points mentioned in the above checklist have been checked and found OK***

Permit Receiver:

Site Engineer (Sub- Contractor):	
Signature:	
Name:	Designation:

Site Safety Officer (Sub-Contractor):	
Signature:	
Name:	Designation:

Permit Issuer:

Engineer of Concerned Execution Department (BHEL):	
Signature:	
Name:	Designation:

Site Safety Officer (BHEL):	
Signature:	
Name:	Designation:

Package-in-charge (BHEL):	
Signature:	
Name:	Designation:

Verified by Customer Representative (if applicable), Name: _____ ***Sign:*** _____ ***Date:*** _____ ***Time:*** _____

(* Permit valid for 7 days, subject to daily renewal, and extension as per overleaf instructions / record formats)

Lifting Activity Work Permit No. & Date: _____

Daily Work Area Condition Endorsement

Sl. No.	Date	Signature with Date & Time		Remarks
		Agency Safety	BHEL Safety	
Day 2				
Day 3				
Day 4				
Day 5				
Day 6				
Day 7				

Permit Extension Beyond Initially Requested Hours

Sl. No.	Extension Period		Remarks	Signature with Date & Time			
	From……. (Date & Time)	To…… (Date &Time)		Agency Site Engineer	Agency Safety Officer	BHEL Site Engineer (PIA)	BHEL Safety Officer
1.							
2.							
3.							
4.							
5.							
6							

TO BE SIGNED BY THE BHEL HSE & EXECUTION AFTER THE WORK IS OVER	
Permit is here by returned after completing the job & ensuring safe removal of men and material.	
Site Engineer, BHEL	**Site HSE Engineer, BHEL**
Signature:	Signature:
Name:	Name:

General Instructions:

1	This Permit is required for all Heavy Lifting Activities that are either / all of the following: 1. Above 50 Tons; 2. Tandem Lifting; 3. Total Load exceeding 75%of capacity of crane; 4. Lift of unusual difficulty or geometry or rigging; 5. Lift over operating Units; 6. Any other Lift as decided by Site HSE / Erection
2	Job Safety Analysis (**JSA**) to be created for every Lift above 5 Tons.
3	This permit must be available at the work site all the times of the work.
4	Location and description of the work, and terms applicable must be clearly indicated by the permittee.
5	This permit shall be endorsed each day after checking all the compliance jointly by the contractor and BHEL safety.
6	Permit shall be issued for not more than **7 days** including the issue date.
7	Permit shall be returned to the HSE Department of BHEL after completion of the job.
8	Before engaging anybody to work, competency and fitness to be ensured.
9	All safety precautions to be taken as per work site HSE plan.
10	**Distribution of copy:** Original- Permittee, Duplicate –Department HOS, Contractor, Triplicate - Site HSE Dept.

HSEP:14-FP07

LOCKOUT/TAGOUT *(LIVE ELECTRICAL MAINTENANCE)* WORK PERMIT	Permit No. & Date
Project & Unit:	**Emergency Contact Nos:**

Exact Location of Work:_____

Nature / Description of Work:_____

Duration of Work Execution *: From Date:_____to Date: _____Daily from _____ hrs. to _____hrs.

Name of Sub-Contractor Performing the Work: _____

Name of Sub-Contractor's Site Engineer (Permit Requesting Authority):_____Sign:_____

Name of Sub-Contractor's Package In-charge:_____Sign:_____Date:_____

The above described work will be done under all the safety precautions mentioned as under during the currency of the Permit.

Tag No.	Device to be Tagged / Locked I.D. No.	Device Location	Device Position *OPEN / CLOSED - ON/OFF*	Lock No.	Tag Lock Placed by Name/Sign - Date/Time		Tag / Lock Removed by Name/Sign - Date/Time	

Declaration: ***All the points mentioned in the above checklist have been checked and found OK***

Permit Receiver:

Site Engineer (Sub- Contractor):		**Site Safety Officer (Sub-Contractor):**	
Signature:		Signature:	
Name:	Designation:	Name:	Designation:

Permit Issuer:

Engineer of Concerned Execution Department (BHEL):		**Site Safety Officer (BHEL):**	
Signature:		Signature:	
Name:	Designation:	Name:	Designation:

Package-in-charge (BHEL):	
Signature:	
Name:	Designation:

Verified by Customer Representative (if applicable), Name: _____***Sign:*** _____***Date:*** _____***Time:*** _____

(* Permit valid for 7 days, subject to daily renewal, and extension as per overleaf instructions / record formats)

Lockout/Tagout Work Permit No. & Date: _____

Daily Work Area Condition Endorsement

Sl. No.	Date	Signature with Date & Time		Remarks
		Agency Safety	BHEL Safety	
Day 2				
Day 3				
Day 4				
Day 5				
Day 6				
Day 7				

Permit Extension Beyond Initially Requested Hours

Sl. No.	Extension Period		Remarks	Signature with Date & Time			
	From……. (Date & Time)	To…… (Date &Time)		Agency Site Engineer	Agency Safety Officer	BHEL Site Engineer (PIA)	BHEL Safety Officer
1.							
2.							
3.							
4.							
5.							
6							

TO BE SIGNED BY THE BHEL HSE & EXECUTION AFTER THE WORK IS OVER

Permit is here by returned after completing the job & ensuring safe removal of men and material.

Site Engineer, BHEL	**Site HSE Engineer, BHEL**
Signature:	Signature:
Name:	Name:

General Instructions:

1	This Permit is required for all maintenance and erection activities with danger of electrocution from Live Electric Power
2	This permit must be available at the work site all the times of the work.
3	Location and description of the work, and terms applicable must be clearly indicated by the permittee.
4	This permit shall be endorsed each day after checking all the compliance jointly by the contractor and BHEL safety.
5	Permit shall be issued for not more than **7 days** including the issue date.
6	Permit shall be returned to the HSE Department of BHEL after completion of the job.
7	Before engaging anybody to work, competency and fitness to be ensured.
8	All safety precautions to be taken as per work site HSE plan.
9	**Distribution of copy:** Original- Permittee, Duplicate –Department HOS, Contractor, Triplicate - Site HSE Dept.

BHEL	**POWER SECTOR** Inspection of First Aid Box	FORMAT NO: **HSEP:14-F01** REV NO.: 00 PAGE NO. 01 OF 02

Name of Site:	
Name of Sub-Contractor:	
Inspected by:	
Date of Inspection:	

Number of employees in the site: -_____

Sl. No.	Item	No. Available	Remarks
1	No. of small sterilized dressings		
2	No of medium sized sterilized dressings		
3	No of large sized sterilized dressings.		
4	No of large sized sterilized burn dressings		
5	No of (15 grams) packets sterilized cotton wool		
6	No of pieces of sterilized eye pads in separate sealed packets.		
7	No of roller bandages 10 cm wide.		
8	No of roller bandages 5 cm wide.		
9	Whether tourniquet available		
10	Whether supply of suitable splints available.		
11	No of packets of safety pins.		
12	Whether kidney tray available		
13	Whether sufficient number of eye wash bottles, filled with distilled water or suitable liquid, clearly indicated by a distinctive sign which shall be visible at all times, available.		
14	Whether 4%-xylocaine eye drops, and boric acid eye drops and soda by carbonate eye drops available.		
15	Whether (60ml) bottle containing a two percent alcoholic solution of iodine available		
16	Whether (two hundred ml) bottle of mercurochrome (2 per cent) solution in water available.		
17	Whether 120ml bottle containing Sal volatile having the dose and mode of administration indicated on the label,		
18	Whether roll of adhesive plaster (6 cm X 1 meter) available		

	POWER SECTOR	FORMAT NO: **HSEP:14-F01** REV NO.: 00 PAGE NO. 01 OF 02
	Inspection of First Aid Box	

Sl. No.	Item	No. Available	Remarks
19	No of rolls of adhesive plaster (2 cm X 1 meter)		
20	Whether snake bite lancet available.		
21	Whether (30 grams) bottle of potassium permanganate crystals available.		
22	Whether a pair scissors available		
23	Whether copy of the First-Aid leaflet issued by the Director-General, Factory Advice service and labor Institutes, Government of India available.		
24	Whether bottle containing 100 tablets (each of 5 grains) of aspirin available		
25	Whether Ointment for burns available		
26	Whether bottle of a suitable surgical anti-septic solution available		
27	Whether List of Contents pasted on First Aid Box along with respective expiry dates		

Signature of Subcontractor's Site I/C **Date:**

BHEL	**POWER SECTOR** Health Check-Up	FORMAT NO: **HSEP:14-F02** REV NO.: 00 PAGE NO. 01 OF 02

Name of Site:	
Name of Sub-Contractor:	
Name of Employee:	
Age:	

History Of Past Illness	H/O Epilepsy:
	H/O Drug Allergy:
	H/O Diabetics/ Hypertension:
	H/O Unconsciousness:
Personal History	

EXAMINATION	**OBSERVATION**
<u>General Physical Examination</u>	
Height	
Weight	
BMI	
Built And nourishment	
Pallor	
Temperature	

Chest Expansion	Inspiration	Expansion
Lymph Node Enlargement		
Upper Limbs Strength & Function		
Lower Limbs Strength & function		
Spine Adequately flexible for the job concerned (Yes/No)		
Mental alertness and stability with good eye, hand and foot co-ordination.		
<u>Ear, Nose, Throat</u>		
Ear / Hearing		
Nose		
Throat		
<u>Vision</u>		

Left Eye	Right Eye

	POWER SECTOR	FORMAT NO: **HSEP:14-F02**
	Health Check-Up	REV NO.: 00 PAGE NO. 02 OF 02

EXAMINATION	**OBSERVATION**	
Cardiovascular System Examination		
Inspection		
Palpation	Pulse	BP
Auscultation (Heart Sounds)		
Respiratory System		
Inspection	Respiratory Rate	
Palpation:		
Percussion		
Auscultation (Breath Sounds)		
Examination of Abdomen		
Inspection		
Palpation		
Auscultation (Bowel Sounds)		
Any Other		
Clinical Impression		

Signature of the examining doctor **Date:**

	POWER SECTOR	FORMAT NO: **HSEP:14-F03**
	HSE Induction / Regular / On-the-Job Training Records	REV NO.: 02 PAGE NO. 01 OF 01

Name of Site:						
Name of Sub-Contractor:						
Date of Training (dd/mm/yyyy):		**Duration (Hrs)**				
		From		**To**		
Name & Details of Trainer:						
Subject of Training	**Induction**		**On-The-Job Training (Give details)**			
Name of Training Co-ordinator:						

Sl. No.	Name	Designation	Organization	Signature

I certify that Training has been carried out as per HSEP04: HSE Procedure for Training & Awareness

Signature of Training Coordinator **Date:**

	POWER SECTOR	FORMAT NO: **HSEP:14-F04** REV NO.: 00 PAGE NO. 01 OF 01
	Toolbox Talk	

Name of Site :	
Sub-Contractors Name :	
Date :	

Topic	**Name of person delivered Tool Box Talk**	**No. of Participants attended**	**Remarks**

Signature of Site I/C of Subcontractor **Date:**

	POWER SECTOR	FORMAT NO: **HSEP:14-F05** REV NO.: 00 Page 01 of **6**
BHEL	Monthly Site HSE Report	

Name of subcontractor:	**Report Month:**

A) Accidents/Incidents Details: -

a	**Lost time in Accidents**	**No. of incidents**	**Man Hours Lost**	**No. of People Involved**	**No. of person reported to Govt.**		
	For the Month						
	Cumulative						
b	**Minor Injuries**						
	For the Month						
	Cumulative						
c	**Fires**	**No. of Near-Misses**	**No. of First- Aid cases**	**No. of persons injured**	**No. of equipment damaged**	**No. of Fire reported Outside**	
	For the Month						
	Cumulative						
d	**Other mishaps not covered in a, b, c.**	**No. of Near-Misses**	**No. of First- Aid cases**	**No. of persons injured**	**No. of equipment damaged**	**Total near misses and First-Aid**	
	For the Month						
	Cumulative						

B) Data for Man-hours worked:

Details	**Value**	**Remarks if any**
No. of people		
Man Hours worked		
O.T. Hours		
Total Man Hours		
Grand Total of man hours worked during the month(A+B)		
Cumulative man-hours (from_____to_____): (Since commencing of operations)		

Signature of Subcontractor Site In-charge **Signature of Subcontractor HSE Officer**

C) Status of Deployment of Work force, Safety Officers/Supervisors & Construction Medical Officer(s) & Electricians:

Description	Name	Qualification & Experience
Safety Officers		
Safety Supervisors		
Construction Medical Officer		
Nursing Staff.		
Electricians		
Scaffolding Inspectors		
T&P Inspectors		

D) Status of deployment of manpower for critical HSE activities:

(All height work and other hazardous activities to be actively supervised by trained personnel. Area to be divided in manageable sections to ensure effective supervision at all times. For example, multiple elevations in a structure can be divided among multiple supervisors)

Activity	Location	Shift Timings	Personnel deployed	Remarks
Height Work	Boiler Unit- (Level 1-3)			
	Boiler Unit- (Level 4-6)			
	ESP			
Housekeeping	Boiler Unit-			
	ESP Unit			
Others				

Signature of Subcontractor Site In-charge **Signature of Subcontractor HSE Officer**

	POWER SECTOR	FORMAT NO: **HSEP:14-F05**
BHEL	Monthly Site HSE Report	REV NO.: 00 Page 03 of **6**

E) Lifting Tools, Tackles, Equipment and Pressure Vessels:

Item	Nos. Deployed	Nos. Tested by competent person	Identification Nos. (Comma separated) (A)	Validities of Test Certificates (Comma separated – corresponding to column A)	Whether internal testing using Color Coding or similar system done
Winches					
Chain Blocks					
Wire Rope Slings					
Man Cages					
D-Shackles					
Air Compressors					
Crawler Cranes					
Mobile Cranes					
Hydra Cranes					
Hydraulic Jack					
Others					

F) Reverse Horns in Construction Vehicles:

Item	Nos. Deployed with serial numbers (Comma separated) (A)	Nos. Having Functional reverse horns	Inspection Dates (Comma separated corresponding to column A)
Transit Mixers			
Hydra Cranes			
Dumpers/Trippers			
Backhoes			
Other Vehicles			

G) ELCBs:

No. Of ELCBs provided with Serial Nos. (Comma separated) (A)	Nos. Functional	When They were last Tested (Comma separated corresponding to column A)

H) Electrical Earthing:

No. Of Earth resources with serial numbers and locations (Comma separated) (A)	Whether Double Earthing provided to all equipment	When they were last tested (Comma separated corresponding to column A)

Signature of Subcontractor Site In-charge **Signature of Subcontractor HSE Officer**

I) Fire Extinguishers

Name & designation of person responsible for maintenance of Extinguishers at different locations :(Individual subcontractor's Safety Officers).

A. FIRE EXITINGUISHERS AT ERECTION SITE:

Type (Add more rows if required)	Sizes	Qty + Serial numbers (Comma separated) (A)	Healthiness – Last checked dates (Comma separated corresponding to column A)	Locations (Comma separated corresponding to column A)
FOAM TYPE				
SODA TYPE				
DRY TYPE (DCP)				
C02 TYPE				

B. FIRE EXTINGUISHERS AT SITE OFFICES & STORES:

Type	Size (Add more rows if required)	Qty + Serial numbers (Comma separated) (A)	Healthiness – Last checked dates (Comma separated corresponding to column A)	Locations (Comma separated corresponding to column A)
FOAM TYPE				
SODA TYPE				
DRY TYPE (DCP)				
C02 TYPE				

J) Tie-Ups with Emergency Services

Service (Add more rows if required)	Name, location & distance from site	Emergency contact details	Remarks
Hospital with ICU and facilities for orthopedic, neurological etc. trauma			
Fire services			
Others:			

Signature of Subcontractor Site In-charge **Signature of Subcontractor HSE Officer**

K) Implementation of Checklist, Work Permits:

Item	Numbers During the Month	Major Deviations
Note:- Please attach photocopies of all filled Checklists & Work permits for that month.		

L) Personal Protective Equipment Issued (Extend table for each subcontractor):

Item	Issued this Month	Nos. Issued up to the Month	Percentage of usage at Site (as per physical verification)
Name of subcontractor:			
Safety Helmet			
Safety Shoes			
Full Body Harness			
Fall Arrestor			
Safety Nets			
Hand Gloves			
Face shield			
Welder shield			
Nose Mask			
Reflective Jacket			
Other PPEs.			

M) Safety Observations by Subcontractor Executives- Observations package wise:

Topic	Date Of Programme	No. Of Participants	Level Of Participants

- **Tool-Box talks on Safety:**

Date	Tool Box Talk - No of Participants	Topic	Remarks

- **Safety Induction Trainings:**

Date	Safety Induction No. of Participants	Topic	Remarks

Signature of Subcontractor Site In-charge **Signature of Subcontractor HSE Officer**

N) Progress of Management Programmes at Site

SL	Description Of MPs	Annual Plan	Achievement In This Month	Cumulative Achievement
A. Environment Improvement Programme				
1	Plantation of Trees			
2	Installation of Scrap Bins			
3	Chemical Storage & Handling system			
B. Improvement of Working Environment				
4	Increasing LTI free days			
5	Air Quality Monitoring			
6	Water Quality Monitoring			
7	Illumination level Monitoring			

O) HR Information:

Designation	Total No. Inducted	Total no. of Induction Balance	Total no. of Gate Pass Issued	Total no. of Gate Pass Balance	Total no. of Gate Pass Cancelled	Medical Checkup Completed	Medical Checkup Balance

P) Rewards on Account of Good Safety Performance

Serial Number	Reward Issued to	Details of Reward Issued (Amount etc.)	Brief Reason
Note: Photos of Reward Functions to be attached			

Q) Other Safety initiatives / Safety Activities conducted (with photos, if any):

Signature of Subcontractor Site In-charge **Signature of Subcontractor HSE Officer**

	POWER SECTOR	FORMAT NO: **HSEP:14-F06**
	Personal Protective Equipment Inspection	REV NO.: 00 PAGE NO. 01 OF 01

Name of Site :	
Name of Sub-Contractor :	
Inspected by :	
Date of Inspection:	

Item	Total Checked	Numbers Found in Order	Remarks
Safety Helmet			
Safety Shoes			
Full Body Harness			
Fall Arrestor			
Safety Nets			
Hand Gloves			
Face shield			
Welder shield			
Nose Mask			
Reflective Jacket			
Other PPEs (Specify)			

Signature of Site I/C of Subcontractor: **Date:**

BHEL	**POWER SECTOR** **Format for Register of Issue and Receipt of PPEs**	FORMAT NO: **HSEP:14-F06** REV NO.: 00 PAGE NO. 01 OF 1

Site:

Subcontractor:

S.N	Name of Person	Details of PPE(s) Issued (with Serial Numbers)	Date Issued	Receiver's Signature	Issuer's Name & Designation	PPE's verified OK / Remarks	Issuer's Signature

	POWER SECTOR	FORMAT NO: **HSEP:14-F07**
	Inspection Of T&Ps	REV NO.: 00 PAGE NO. 01 OF 01

Name of Site :	
Name of Sub-Contractor :	
Date of Inspection :	

Sl.No.	**Description**		**Remarks**
1.0	Name of equipment		
2.0	Basic Information of equipment		
2.1	Specification		
2.2	Sr. No. of equipment		
2.3	Make		
2.4	Year of manufacture		
3.0	Major repairs / overhauls(Furnish details of work carried out)		Date(s) of major repair/overhaul
3.1			
3.2			
3.3	Repairs carried out at site		
4.0	Any performance test conducted	Yes/No	
5.0	Document Submitted	Yes/No	
6.0	Manufacturer's test / guarantee certificate	Available/ Not available	
7.0	Performance test	Done/ Not Done	
8.0	Acceptance Norms		
9.0	Committee Observations		
10.0	Date of next review (if accepted)		

Signature-Subcontractor HSE Officer	**Signature-Subcontractor Site In-charge**

	POWER SECTOR	FORMAT NO: **HSEP:14-F08** REV NO.: 00 PAGE NO. 01 OF 01
	Inspection Of Cranes	

Name of Site :	
Name of Sub-Contractor :	
Inspected by :	
Date of Inspection:	

Crane Reg. No (Make/Model) _____

Name of Driver/Operator _____

Sl.no.	Description	Observation	Measures
1	Valid Driving license		
2	Hook & Hook Latch		
3	Over Hoist limit switch		
4	Boom limit switch		
5	Boom Angle Indicator		
6	Boom limit cutoff switch		
7	Condition of Boom		
8	Condition of ropes		
9	Number of load lines		
10	Size and condition of the slings		
11	Stability of the cranes		
12	Soil Condition		
13	Swing Break And Lock		
14	Proper Break And Lock		
15	Hoist Break And Lock		
16	Boom Break And Lock		
17	Main Clutch		
18	Leakage in Hydraulic Cylinders		
19	Out riggers filly extendable		
20	Tyre pressure		
21	Condition of Battery And Lamps		
22	Guards of moving and rotating parts		
23	Load chart provided		
24	Number and position of pedant ropes		
25	Reverse Horn		
26	Load Test Details		
27	Operator's fitness		
28	Pollution under control certificate		
29	Fire extinguisher of appropriate type.		
30	Training of the operator		

Signature of Site I/C of Subcontractor: **Date:**

	POWER SECTOR	FORMAT NO: **HSEP:14-F09** REV NO.: 00 PAGE NO. 01 OF 01
BHEL	Inspection Of Winches	

Name of Site :	
Name of Sub-Contractor :	
Inspected by :	
Date of Inspection:	

Winch Reg. No (Make/Model) _____

Name of Operator _____

Sl. No.	Description	YES	NO	NA	Remarks
1	Has the copy of Third Party Inspection certificate been provided in winch machine shed?				
2	Is safe operating instructions displayed near winch?				
3	Is winch machine operator experienced enough to operate the winch machine?				
4	Is the winch machine operated by someone other than the winch machine operator?				
5	Is there guard provided in all moving parts like wheel and motor's shaft?				
6	Will it protect against unforeseen operational contingencies?				
7	Are brakes, clutch and locking arrangement working properly?				
8	Has it been ensured that the guard does not constitute a hazard by itself?				
9	Are the cranks and the connecting rods protected by guardrails?				
10	Is there provision for fully covered shed with wooden plank roof?				
11	Is wire rope free from any kind of damage or wear and tear?				
12	Is split pin provided for the protection of clutch and brake locking arrangement?				
13	Is pulley inspected by competent person and certified before use?				
14	Is pulley free from any wear and tear visually?				
15	Is winch rope barricaded with clipsheet for the protection of rope and person?				
16	Is the wire rope lubricated by cardium oil?				
17	Is there any friction in wire rope which may damage the wire rope rather than the rolling parts?				
18	Is there any oil leakage in the hydraulic system of the winch machine?				
19	Has it been ensured that the guard will not cause discomfort or inconvenience to operator?				

Total NO		**Total NA**		**% Compliance**	

Signature of Site I/C of Subcontractor: **Date:**

	POWER SECTOR	FORMAT NO: **HSEP:14-F10** REV NO.: 00 PAGE NO. 01 OF 2
	Inspection of Height Working	

Name of Site :	
Name of Sub-Contractor :	
Inspected by :	
Date of Inspection:	

Sl. No.	Descriptions	Observation (Yes/No)	Remarks
	A. General		
1	All the workers have been explained safe work method?		
2	Adequate illumination has been ensured.		
3	Work area inspected prior to the start of the work.		
4	Is the work area barricaded to prevent fall and platforms are of adequate strength (bamboo, jute / plastic ropes not to be used).		
5	The temporary work platforms & structures for height work including those used in Boiler structures, water walls, ESP, Powerhouse are fully barricaded with railings (as per **IS 3696**)		
6	Fabricated makeshift arrangements are checked for quality and type of material welding, anchoring etc.		
7	Are floor gaps, permanently covered and barricaded		
8	Area below the work place barricaded, particularly below hot work.		
9	Workers provided with bags /box to carry bolts, nuts and hand tools		
10	Arrangement for fastening hand tools made.		
11	All work platforms ensured to be of adequate strength and ergonomically suitable.		
12	Work at more than one elevation at the same segment is restricted.		
13	An established communication system has been established and explained to the workers.		
	B. **Access/Egress**		
1	Walkways provided with handrail, mid-rail and toe guard?		
2	All checkered plates, gratings properly welded/ bolted?		
3	Are ladders inspected and they are in good condition?		
4	Are ladders spliced?		
5	Are ladders properly secured to prevent slipping, sliding or falling?		
6	Stairs erected above and below 1 tier column for safe access?		
7	Do side rails extend 36” above top landing?		

	POWER SECTOR	FORMAT NO: **HSEP:14-F10** REV NO.: 00 PAGE NO. 02 OF 2
BHEL	Inspection of Height Working	

Sl. No.	Descriptions	Observation (Yes/No)	Remarks
8	Are built up ladders constructed of sound materials?		
9	Are rugs and cleats not over 12” on center?		
10	Metal ladders not used around electrical hazards.		
11	Proper maintenance and storage.		
12	Ladders placed at right slope.		
13	Ladders / staircases welded/ bolted properly.		
14	Any obstruction in the stairs.		
15	Are landing provided with handrails, knee rails, toe boards etc.?		
16	Whether ramp is provided with proper slope.		
17	Proper hand rails / guards provided in ramps.		
	C. **Housekeeping**		
1	Walkways, aisles & all overhead workplaces cleared of loose material.		
2	Is any nut bolt/scrap left on beam/column?		
3	Flammable materials, if any, are cleared.		
4	All the de shuttering materials are removed after de shuttering is done.		
5	Platforms and walkways free from oil/grease or other slippery material.		
6	Collected scrap are brought down or lowered down and not dropped from height.		
	D. **PPE And Safety Devices**		
1	Use of safety helmet, safety belts ensured for all workers		
2	Anchoring points provided at all places of work.		
3	Common lifeline provided wherever linear movement at height is required.		
4	Safety nets are use wherever required.		
5	Proper fall arrest system is deployed at critical workplaces.		
6	Crawler boards/Safety system or works on fragile roof are used.		
7	Is man-lift being used for personnel lifting?		
8	Does man basket / personnel lift system has an independent lifeline and all occupants safety harnesses connected to it with rope grab?		

Signature of Site I/C of Subcontractor: **Date:**

BHEL	**POWER SECTOR** Inspection of Welding and Gas Cutting	FORMAT NO: **HSEP:14-F11** REV NO.: 00 PAGE NO. 01 OF 02

Name of Site :	
Name of Sub-Contractor :	
Inspected by :	
Date of Inspection :	

Welding				
Sl.no.	Description	Yes	No	Remarks
1	Is electric connection given through 30 mA ELCB/RCCB to welding m/c?			
2	Is welding machine more than 10 years old?			
3	Is there provision of fuse and is it bypassed?			
4	Is electric cable fitted properly in junction box on m/c?			
5	Is electrical cable free from joints?			
6	Are the joints attached firmly & insulated with tape?			
7	Is double earthing given to body of m/c?			
8	Is the physical condition of the m/c good?			
9	Is ON/OFF switch connected to the m/c is working and in good condition?			
10	Are indication lamps on m/c working?			
11	Is the electrode holder in good condition?			
12	Are the cables of the welding m/c lugged & tight properly?			
13	Is cable to welding machine terminal joint lose / burnt / glowing?			
14	Are return lead connected properly (Rod, Angle, Channels shall not be used)			
	Total No of NO			
	Total No of YES			

Signature of Site I/C of Subcontractor: **Date:**

BHEL	**POWER SECTOR** Inspection of Welding and Gas Cutting	FORMAT NO: **HSEP:14-F11** REV NO.: 00 PAGE NO. 02 OF 02

Gas Cutting				
Sl.no	Description	Yes	No	Remarks
1	Are Cylinders kept on trolleys?			
2	Physical condition of Gas cylinders Good?			
3	Is there Oil/Grease on valve of the cylinder?			
4	Are pressure regulators in good condition?			
5	Condition of hose pipe OK?			
6	Are hose pipe clamped with hose clip?			
7	Is flash back arrestor & NRV fitted on torch both for O2 and LPG cylinder?			
8	Is nozzle of the torch cleaned?			
	Total Number of NO			
	Total No of YES			
	% Compliance			

Signature of Site I/C of Subcontractor: **Date:**

BHEL	**POWER SECTOR** **Inspection Of Electrical Installation**	FORMAT NO: **HSEP:14-F12** REV NO.: 00 PAGE NO. 01 OF 02

Name of Site :	
Name of Sub-Contractor :	
Inspected by :	
Date of Inspection :	

Sr. No.	**Contents**	**Yes/No**	**Remarks**
A	**Cable**		
1.	Whether the condition of cable is checked?		
2.	Are cables received from other sites checked for insulation resistance before putting them into use?		
3.	Are all main cables taken either underground / overhead?		
4.	Are welding cables routed properly above the ground?		
5.	Are welding and electrical cables overlapping?		
6.	Is any improper joining of cables/wires prevailing at site?		
B	**DBs/SDBs**		
1.	Is earth conductor continued up to DB / SDB?		
2.	Whether DBs and extension boards are protected from rain / water?		
3.	Whether DB and extension board have separate MCB/ELCB		
4.	Is there any overloading of DBs / SDBs?		
5.	Are correct / proper fuses & CBs provided at main boards and sub-boards?		
6.	Is energized wiring in junction boxes, CB panels & similar places covered all times?		
C	**ELCB**		
1.	Whether the connections to all equipment are routed through individual ELCBs?		
2.	Is sensitivity of each ELCB maintained at 30 mA?		

BHEL	**POWER SECTOR** **INSPECTION OF ELECTRICAL INSTALLATION**	FORMAT NO: HSEP:14-F12 REV NO.: 00 PAGE NO. 02 OF 02

Sr. No.	Contents	Yes/No	Remarks
3.	Are the ELCB numbered and tested periodically & test results recorded in a logbook countersigned by a competent person?		
D	**Grounding**		
1.	Is natural earthing ensured at the source of power (main DB at Generator or Transformer)?		
2.	Whether the continuity and tightness of the earth conductor are checked?		
3.	Mention the gauge of the earth conductor used at the site.		
4.	Mention the value of Earth Resistance.		
E	**Electrically operated Machines or Accessories**.		
1.	Whether the plug top is provided everywhere.		
2.	Are all metal parts of electrical equipment and light fittings / accessories grounded / double earthed?		
3.	Is there any shed or cover for welding machines?		
4.	Are halogen lamps fixed at proper places?		
5.	Are portable power tools maintained as per norms?		
6.	Any other information:		

Signature of Site I/C of Subcontractor: **Date:**

बी एच ई एल BHEL	**POWER SECTOR** **Inspection of Elevator**	FORMAT NO: **HSEP:14-F13** REV NO.: 00 PAGE NO. 01 OF 01

Name of Site :	
Name of Sub-Contractor :	
Inspected by :	
Date of Inspection :	

Sr. No.	**Description**	**Remarks**
1.0	Name of equipment	
2.0	Basic Information of equipment	
2.1	Specification	
2.2	Sr. No. of equipment	
2.3	Make	
2.4	Year of manufacture	
3.0	Major repairs/overhauls(Furnish details of work carried out)	Date(s) of major repair/overhaul
3.1		
3.2		
3.3	Repairs carried out at site	
4.0	Any performance test conducted	Yes/No
5.0	Document Submitted	Yes/No
6.0	Manufacturer's test / guarantee certificate	Available/ Not available
7.0	Performance test	Done/ Not Done
8.0	Acceptance Norms	
9.0	Committee Observations	
10.0	Date of next review (if accepted)	

Signature-Subcontractor/ Subcontractor's Safety Officer **Signature-Site Safety Officer (BHEL)**

	POWER SECTOR	FORMAT NO: **HSEP:14-F14**
BHEL	**HSE Penalty Format**	REV NO.: 00 PAGE NO. 01 OF 2

Sub: MEMO for Penalty for non-compliances in Safety and Fabrication Quality requirement

Following lapse (tick marked) was observed and penalty is imposed as stated at the bottom of this memo. It is requested that such occurrences may please be avoided in future.

S. No	Nature of Non - Compliance	Penalty (in Rs.)	Remarks
	A. PPEs		
1.	Not wearing safety helmet / wearing without chin straps	500	Per Person/ day
2.	Not Wearing safety shoes	500	Per Person/ day
3.	Not wearing gloves, nose masks where required	350	Per Person/ day
4.	Not using grinding goggles while doing grinding operations	500	Per Person/ day
	B. Height Work		
1.	Not providing Lifelines for height work	1000	Per location per day
2.	Not ensuring barricading of working platforms	1000	Per location per day
3.	Not using temporary platform during work at height	1000	Per case per day
4.	Not wearing safety belt while working at height (> 2 meters) or not anchoring to lifeline	2000	Per Person/ day
5.	Not providing proper barricades (caution tape at 2 elevations)	500	Per location per day
	Use of mobile phones by Height worker / Crane / Hydra Operator	1000	Per case per day
	C. Electrical		
1.	Not using 24 V supply for lighting in confined spaces	500	Per case per day
2.	Lack of Electrical Earthing	2000	Per case per day
3.	Improper earthing of welding & Other electrical Machines. Earth resistance not OK	500	Per Machine per incidence
4.	Electrical plug not used for connection/ hand machines	500	Per connection per incidence
5.	Unsafe electrical practice like not installing ELCB/ RCCB	500	Per case per day
6.	Using frayed/ broken welding cables	500	Per machine per week
	D. Lifting		
1.	Use of lifting equipment without having valid Third Party Test certificate	5000	Per equipment per seven days
2.	Lifting hooks without latches	500	Per hook per day
3.	Using damaged slings or not slinging properly	2000	Per event Per T&P
4.	Lifting cylinders without cage or rolling of cylinders	500	Per Event per incidence
5.	Non removal of scrap from platforms	1000	**Per Event Per location per 7 days**
	E. Hot Work / Cylinder Handling		
20.	Gas cutting without flash back arrestor	2000	Per machine per incidence
21.	Gas cutting at height without sheet below	500	Per event
22.	Not keeping gas cylinders vertically / in trolley on ground	500	Per event
23.	Gas cutting with damaged hose pipes	500	Per event
	Not covering welding cylinder with top cover	500	Per event
	F. Construction Vehicles		
24.	Not having valid driving license for the type of vehicle/ T&P	2000	Per driver per event
25.	Two wheeler entry in construction area	500	Per vehicle
26.	Using Hydra for material movement at site in unsafe manner	1000	Per case
27.	Using Two Hydra in Tandem for material movement	2000	Per case
28.	Vehicles, Hydras, Cranes, Dumpers and Earth Movers not having automatic back horns linked to gear	1000	Per Equipment per day
29.	Not using guide rope while moving material using Hydra or Crane	1000	Per event
30.	Violating speed limit during vehicle movement	1000	Per event

	POWER SECTOR **HSE Penalty Format**	FORMAT NO: **HSEP:14-F14** REV NO.: 00 PAGE NO. 02 OF 2

	Nature of Non - Compliance	Penalty in Rs.)	Remarks
Engineering / Administrative Controls / General			
31.	Major Accident – Victim not reporting for work within 48 hours – resulting in partial loss in earning capacity & termination / demotion in employment	200000	
32.	Fatal Accident/Accidents Resulting in total Loss in Earning Capacity #	500000	Per victim#
33.	Unsafe Act in violation of standards / clauses of this document	500-5000	Per case
34.	Activity carried out without safety work permit where applicable	2000	Per person per event
35.	Using untrained / unqualified personnel for hazardous work	2000	Per event
36.	Not maintaining proper hygiene in canteen as per BOCW	1000	Per event

 # or as deducted by customer, whichever is higher.

For repeated **major and** fatal incidents under the same subcontractor for the same package in the same Unit, the subcontractor will pay 2 times the penalty compared to previously paid

Details (if any) related to non- compliance (Name of persons, Nature of deficiency, etc.)

Penalty imposed: _____

1, Rate as per above chart_____

2. No. of Persons/ machine/ event/ labor_____

3. Total Penalty= 1. X 2. =_____

BHEL Personnel:

Signatures:

Name_____

Attachments: Photographs & Documentary proof (if available) for violation

Distribution: 1 Copy: to Sub- contractor Site In-charge,
1 Copy to Site Construction Manager (BHEL)

BHEL	**POWER SECTOR** **Format for Initial Verification of PPE's & Lifting Tools & Tackles**	FORMAT NO: **HSEP:14-F15** REV NO.: 00 PAGE NO. 01 OF 1

Name of Site :	
Name of Sub-Contractor :	
Inspected by :	
Date of Inspection :	

S. No	Particulars (Serial Number, make, model of PPE, T&P)	Accepted / Rejected	Remarks

BHEL	**POWER SECTOR** **Format for Inspection of Labor Colony**	FORMAT NO: **HSEP:14-F16** REV NO.: 00 PAGE NO. 01 OF 1

Name of Site :	
Name of Sub-Contractor :	
Inspected by :	
Date of Inspection :	

S. No	Particulars	No	Yes	Comments
1	Sufficient living space ensured for each occupant with Kitchen area			
2	Area cleanliness ensured through regular cleaning			
3	Toilet facility sufficient for all occupants available, in order with adequate lighting, cleaned regularly and in hygienic condition			
4	Washing facilities available with adequate water supply			
5	Availability of sufficient drinking water in protected tanks with weekly tank cleaning and source tested annually as per IS10500 ensured			
6	Adequate drainage to remove waste and rain water, no flooding			
7	"Unsafe for Drinking" posted near accessible non-potable water and sources; posted in language of occupants or universal symbol			
8	Prevention of mosquitoes, flies, and rodents in immediate housing area through insecticide sprays if required			
9	Electricity provided & electrical connections safety ensured			
10	Fans, Coolers / Quilts, Heaters provided as required to cater to weather conditions along with adequate electricity supply			
11	Houses Walls and roof tight and solid; floors rigid and durable, with smooth, cleanable finish in good repair			
12	Availability of nominal rate ration / common use items shop within / nearby the colony			
13	Emergency medical plan developed: (A) Potential injuries determined (B) Local EMS response determined (C) Qualified first-aid person on site, if required			
14	Emergency plans posted where employees gather			
15	Transportation to nearest suitable facility			
Any other checks:				
Remarks:		**Name & Sign. Of Subcontractor** **HSE Officer**		

बी एच ई एल BHEL	**POWER SECTOR** **Format for Recording of First Aid Injuries**	FORMAT NO: **HSEP:14-F17** REV NO.: 00 PAGE NO. 01 OF 1

Name of Site:

Name of Subcontractor:

Date:	Time:	Name of patient:	Subcontractor	Description of injury:	How the injury occurred:	Treatment provided:	First Aider Name:	Initials:	Reportable: Yes/No

बीएचईएल BHEL	**POWER SECTOR** **Format for Maintaining Records of E-waste Handled / Generated**	FORMAT NO: **HSEP:14-F18** REV NO.: 00 PAGE NO. 01 OF 1

(Generated Quantity in Metric Tons (MT) per year)

Site		
Subcontractor		
Date		
Types & Quantity of e-waste handled/generated**	Category	Quantity
	Item Description	
Types & Quantity of e-waste stored	Category	Quantity
	Item Description	
Types & Quantity of e-waste sent to collection center authorized by producer/dismantler/recycler/refurbisher or authorized dismantler/ recycler or refurbisher **	Category	Quantity
	Item Description	
Types & Quantity of e-waste transported*	Category	Quantity
	Item Description	
Name, address and contact details of the destination		
Types & Quantity of e-waste refurbished*	Category	Quantity
	Item Description	
Name, address and contact details of the destination of refurbished materials		
Types & Quantity of e-waste dismantled*	Category	Quantity
Name, address and contact details of the destination	Item Description	
Types & Quantity of e-waste recycled*	Category	Quantity
Types & Quantity of materials recovered	Item Description	
	Quantity	
Name, address and contact details of the destination		
Types & Quantity of e-waste sent to recyclers by dismantlers	Category	Quantity
	Item Description	
Name, address and contact details of the destination		
Types and Quantity of other waste sent to respective recyclers by dismantlers / recyclers of e-waste	Category	Quantity
Name, address and contact details of the destination	Item Description	
Types and Quantity of e-waste treated & disposed	Category	Quantity
	Item Description	
Name, address and contact details of the destination		

Signature of Subcontractor Site In-charge: **Date**

BHEL	**POWER SECTOR** **Format for Maintaining Records of Hazardous Waste at the Facility**	FORMAT NO: **HSEP:14-F19** REV NO.: 00 PAGE NO. 01 OF 1

1. Name of Site:
2. Name of the Subcontractor:
3. Date:
4. Description of hazardous waste:

Physical form with description	Chemical form	Total volume and weight (in kg.)

5. Description of storage and treatment of hazardous waste:

Date	Method of storage of hazardous wastes	Date	Method of treatment of hazardous wastes

6. Details of transportation of hazardous waste:

Name & address of consignee of package	Mode of packing/of the waste for transportation	Mode of transportation to site of disposal	Date of transportation

7. Details of disposal of hazardous waste:

Date of disposal	Concentration of hazardous material in the final waste form	Site of disposal (identify the location on the relevant layout drawing for reference)	Method of disposal	Persons involved in disposal

8. Data of environmental surveillance:

Date of measurement	Analysis of ground water			Analysis of soil samples			Analysis of air sampling			Analysis of any other samples (give details)
	Location of sampling	Depth of sampling	Data	Location of sampling	Depth of sampling	Data	Location of sampling	Data		

9. Details of the hazardous wastes reused and recycled:

Date	Total quantity of hazardous waste generated	Details of hazardous waste minimization activity	Material received	Final quantity of waste generated	Net reduction in waste generation quantity and percentage

Signature of Subcontractor Site In-charge: **Date:**

BHEL	**POWER SECTOR** **HSE Audit / Inspection Checklist-cum-Compliance Report**	FORMAT NO: **HSEP:14-F20** REV NO.: 00 PAGE NO. 01 OF 3

PROJECT:_____ CONTRACTOR:_____

DATE:_____ OWNER :_____

INSPECTION BY:_____

Note : write 'NA' wherever the items is not applicable

Item	Yes	No	Remarks	Action
HOUSEKEEPING				
Waste containers provided and used				
Passageways and walkways clear				
General neatness of working area				
Other				
PERSONNEL PROTECTIVE EQUIPTMENT				
Goggles; shields				
Face protection				
Hearing protection				
Respiratory masks etc.				
Safety belts				
Other				
EXCAVATIONS / OPENINGS				
Openings properly covered or barricaded				
Excavations shored				
Excavations barricaded				
Overnight lighting provided				
Other				
WELDING, CUTTING				
Gas cylinders chained upright				
Cable and hoses not obstructing				
Fire extinguisher (s) accessible				
Others				
SCAFFOLDING				
Fully decked platforms				
Guard and intermediate rails in place				
Toe boards in place				
Adequate shoring				
Adequate access				
Others				
LADDER				
Extension side rails 1 m above				
Top of landing				
Properly secured				
Angle + 70_0 from horizontal				
Other				

	POWER SECTOR **HSE Checklist-cum-Compliance Report**	FORMAT NO: **HSEP:14-F20** REV NO.: 00 PAGE NO. 02 OF 3

HOISTS, CRANES AND DERRICKS				
Condition of cables and sheaf OK				
Condition of slings, chains, hooks OK				
Inspection & maintenance log maintained				
Outriggers used				
Signals observed and understood				
Qualified operators				
Others				
MACHINERY, TOOLS & EQUIPMENT				
Proper instruction				
Safety devices				
Proper cords				
Inspection and maintenance				
Other				
VEHICLE AND TRAFFIC				
Rules and regulations observed				
Inspection and maintenance				
Licensed drivers				
Other				
TEMPORARY FACILITIES				
Emergency instructions posted				
Fire extinguishers provided				
Fire-aid equipment available				
General neatness				
Others				
FIRE PREVENTION				
Personnel instructed				
Fire extinguishers checked				
No smoking in prohibited areas.				
Hydrants				
Clearance				
Others				
ELECTRICAL				
Proper wiring				
ELCB’s provided				
Ground fault circuit interrupters				
Protection against damage				
Prevention of tripping hazards				
Other				
HANDLING & STORAGE OF MATERIALS				
Properly stored or stacked				
Passageways clear				
Other				
FLAMMABLE GASES AND LIQUIDS				
Containers clearly identified				
Proper storage				
Fire extinguisher nearby				
Other				

	POWER SECTOR **HSE Checklist-cum-Compliance Report**	FORMAT NO: **HSEP:14-F20** REV NO.: 00 PAGE NO. 03 OF 3

WORKING AT HEIGHT				
Safety nets				
Safety belts				
Safety helmets				
Anchoring of safety belt to the life line rope				
ENVIRONMENT				
Lubricant waste/engine oils properly dispose.				
Waste from Canteen, offices, sanitation etc. disposed properly.				
Disposal of surplus earth, stripping materials, expired batteries, oily rags and combustible materials done properly.				
HEALTH CHECKS				
Hygienic conditions at labor camps O.K.				
Availability of first-aid facilities				
Proper sanitation at site, office & labor camps.				
Arrangement of medical facilities.				
Measures for dealing with illness.				
Availability of potable drinking water for workmen & staff.				
Provision of crèches for children.				

Signature of Subcontractor Site In-charge: **Date:**

BHEL	**POWER SECTOR** **Format for Inspection of Illumination / Lux Levels**	FORMAT NO: **HSEP:14-F21** REV NO.: 00 PAGE NO. 01 OF 1

Name of Site :	
Name of Sub-Contractor :	
Inspected by :	
Date of Inspection :	

Details of Lux Meter Used for Illumination Checking					
Serial Number		**Last inspection Date**		**Inspection Due Date**	

S. No	Location	Applicable Lux Value	Measured Lux Value	Comments
1				
2				
3				
4				
5				
6				
7				
8				
9				
10				
11				
12				
13				
14				
15				
Any other checks:				

Remarks:	**Name & Sign. Of Subcontractor HSE Officer**

BHEL	**POWER SECTOR** **Format for Incident Reporting**	FORMAT NO: **HSEP:14-F22** REV NO.: 00 PAGE NO. 01 OF 2

Type of incident: Fatal/Major//Fire/Property damage (Tick what is applicable)

1	**Name Of Site**		**3**	**Activity Area**	
2	**Scope Of Work**		**4**	**Name Of Contractor**	
			5	**NAME & DESIGNATION OF BHEL ACTIVITY I/C**	
6	**Date & Time Of Accident**		**7**	**Date Resumed**	
8	**No. Of Work-Days Lost by Victim (If Duty Not Resumed, Give Estimated Figure)**				
9	**No. Of Man-hours Lost By Others**				
10	**Personal Details Of Injured and/or Details Of Materials/Equipment/ Property Damaged**				

Name				**Name Of Material / Equipment / Property**	
Period Of Employment					
Age	Yrs.	**Sex**	Male/Female	**Estimated Cost**	**Actual Cost**
Marital Status		Single/ Married			
Occupation				**Nature Of Damage**	
Part Of Body Injured					
Nature Of Injury					
Agency (Object / Equipment / Substance) Most Responsible For Causing Accident / Injury / Damage					
12	**Person (Name & Designation) With Most Control Over Agency (Object / Equipment / Substance) Causing Accident Injury / Damage**				
13	**Describe Clearly How the Accident Occurred (Use Additional Sheet, If Required)**				

	POWER SECTOR **Format for Incident Reporting**	FORMAT NO: **HSEP:14-F22** REV NO.: 00 PAGE NO. 02 OF 2

Analysis		
14	**What Acts and/or Conditions Contributed Most Directly to This Accident**	
15	**What Are the Basic Reason for The Existence of These Acts and/or Condition?**	
16	**What Corrective Actions Have Been Taken to Prevent Accident Recurrence?**	
	Date:	**Signature Of Site HSE Coordinator**
17	**Comments of Head/Sox**	
	Date:	**Signature Of Head/SOX**

	POWER SECTOR	FORMAT NO: **HSEP:14-F23**
	Format for Incident Recording	REV NO.: 00 PAGE NO. 01 OF 1

Name of the Site									
Name of the Subcontractor									
Sl. No.	**Date & Time**	**Incident Type** (Near Miss /Minor/Major/Fatal/Fire/ Property Damage)	**Incident Location & Details**	**Basic Reason**	**Numbers Injured (Types of Injuries)**	**Sign**	**RCA Done**	**CAPA Details**	**Sign**

BHEL	**POWER SECTOR** **Format for Monthly HSE Planning & Review**	FORMAT NO: **HSEP:14-F30** REV NO.: 00 PAGE NO. 01 OF 3

Note: This is a template and can be modified in consultation with BHEL			
Name of the Site		**Name of the Subcontractor**	
Scope of Work		**Date**	
PART- A: PLAN OF HSE ACTIVITIES FOR THE MONTH OF……			**PART-B: REVIEW ON ……**
SN.	**Description of HSE Activity & Formats**	**Plan & Targets for the month**	**Review**
1	Availability of First Aid Box at Required Places and Inspection thereof as per Format: F01	Areas 1. … …	
2	Health check-up as per Format: F02	Health check-up for Nos 1. New inductees 2. Drivers & Operators 3. Workers in following high risk areas: a. …	
3	Induction training of newly joined workers as per Format: F03	Minimum No. of workers:	
4	Toolbox talks (TBT) conducted before start of work as per Format: F04	Locations of TBTs & No. of workers **1.** …	
5	PPE usage and issue as per Format: F06		
6	Inspection of T&Ps as per Format: F07	List of T&Ps to be inspected 1.	
7	Identification & Inspection Status of T&Ps as per Format: F08		
8	Inspection of Cranes & Winches as per Format: F09	List of Cranes & Winches & Nos. 1. …	
9	Inspection of Height Working as per Format: F10	Areas: 1. …	
10	Inspection of Welding & Gas Cutting operations as per Format: F11	Areas: 1. …	
11	Inspection of Electrical Installations as per Format: F12	Locations: 1. …	
12	Inspection of Elevators (as applicable) as per Format: F13	Locations: 1. …	
13	Inspection of Excavation as per Format: F13E	**Locations:** **1. …**	

BHEL	**POWER SECTOR** **Format for Monthly HSE Planning & Review**	FORMAT NO: **HSEP:14-F30** REV NO.: 00 PAGE NO. 02 OF 3

SN.	Description of HSE Activity & Formats	Plan & Targets for the month	Review
14	Job Safety Analysis as per Format F32B	**Activities:** **1. …**	
15	Regular Job Specific Training (Re-training) for workers involved in hazardous activities	Topics/ Hazards & No. of workers **1.** …	
16	Mass housekeeping (HK) drive in work areas	Areas **1.** …	
17	Vertigo Test of Height workers	Minimum No. of workers:	
18	Deployment of qualified HSE Officers as per contract	Location(s) & Nos. **1.** …	
19	Deployment of qualified HSE Stewards as per contract	Location(s) & Nos. **1.** …	
20	Deployment of Safety tools & Equipment (Safety Nets, Lifelines, Fall arrestors, Man-cages, flashback arrestors, scaffolding etc.)	Tool/ Equipment & Location **1.** …	
21	Safety Walks by site in charge of agency (4 -Weekly once)	Dates:	
22	Safety walks by departmental head (8-Weekly twice)	Dates:	
23	Availability/ deployment of Safety posters/ placards/ signage at strategic locations	Locations: Nos. **1.** …	
24	Provision of clean drinking water sources for workers	Locations: Nos. **1.** …	
25	Provision of toilets for workers (separate for male & female workers)	Locations: Nos. **1.** …	
26	Rest sheds for workers during lunchtime, rain, dust storm etc.	Locations: Nos. **1.** …	
27	Availability of following in Labor colony	**1. Clean drinking water** **2. Toilets** **3. Cleanliness & Hygiene** **4. Grass cutting,** **5. Fogging** **6. Electrical Inspection …**	

BHEL	**POWER SECTOR** **Format for Monthly HSE Planning & Review**	FORMAT NO: **HSEP:14-F30** REV NO.: 00 PAGE NO. 03 OF 3

SN.	Description of HSE Activity & Formats	Plan & Targets for the month	Review
28	Availability of dust/ waste bins at various locations	Locations: **1.** …	
29	Availability of Ambulance (individual/ joint) in each shift	Ambulance No.	
30	Availability of emergency vehicle in each shift	Emergency vehicle	
31	Deployment/ Availability of tested Fire Extinguishers	Locations & Nos. **1.** …	
32	Tree plantation	Locations & Nos. **1.** …	
33	Waste disposal & Scrap Bins	Locations **1.** …	
34	Illumination checks	Locations **1.** …	
35	Safety award function: 1. Display of good practices Award presentation	Minimum 1 per month	
36	**Submission of Daily Reports as per Format No.F31A**	**Daily Reports (Night & Day Shifts)**	

PLAN		**REVIEW**	
Agency Name: Sign: Date:	**BHEL** Name: Sign: Date:	**Agency** Name: Sign: Date:	**BHEL** Name: Sign: Date:

BHEL	**POWER SECTOR** **Format for Daily HSE Reporting**	FORMAT NO: **HSEP:14-F31** A REV NO.: 00 PAGE NO. 01 OF 1

Note: Following format to be submitted (preferably) in excel/ soft copy by subcontractor daily at the end of each shift. Any photographs/ records to be attached

Site									**Subcontractor**																		
Year							**Month**													**Day**							
SHIFT	Submitted By	Work Area(s)	Staff	Man-Power	Safety Officers	Safety Stewards	Tool Box (Topics and No. of Participants)	Induction Training (No. of Participants)	Vertigo Test (Numbers Tested)	On-the-Job Training (Topic & participants)	Work Permits	Job Safety Analyses conducted	Height Work Inspection	Other Hazardous Activities Inspection	T&P Inspection (Names & Nos. Inspected)	Safety Walk (Designation, Areas)	HSE Meeting	Safety Reward (Details)	Housekeeping/ Dust Suppression/ Tree Plantation Activities (Locations/Details)	Lost time Accident	Restricted Work Case	Medical Treatment Case	First Aid Case	Near miss	Property Damage/ Fire	Non-Compliances Submitted by BHEL	Complied by Agency	Any other Remarks/ Inputs
Day																											
Night															NA		NA	NA	NA								

बीएचईएल BHEL	**POWER SECTOR** **Job Safety Analysis Format**	FORMAT NO: **HSEP:14-F32B** REV NO.: 00 PAGE NO. 01 OF 1

Name of the Site	
Name of the Subcontractor	
Activity, Area	

HAZARDS	**PRECAUTIONS**

(Name)	**Submitted By (Agency HSE)**		**Reviewed By (BHEL Execution)**		**Approved By (BHEL HSE)**	
(Sign)						
(Date)						

	POWER SECTOR- HQ	FORMAT NO: HSEP:14-F33 REV NO.: 00 PAGE NO. 01 OF 3
BHEL	Checklist for Evaluation of HSE Performance	

SL	Parameter for Measurement	M/ O	Wt	Supporting Documents
1a	Induction training for new workers conducted through audio-visual medium & documented ?	M	1	Induction Training Records
1b	Tool box talk conducted regularly as per plan, and documented?	M	1	Toolbox Talk Records
1c	Contractor in charge and safety in charge attended safety meetings?	M	2	Minutes of Meeting
1d	Whether observations in safety meetings are complied before next meeting?	M	2	-do-
1e	Preparation and submission of Monthly HSE report within stipulated time	M	1	Report submission date
1f	Preparation and submission of Incident/near-miss report and RCA Report (as applicable) within stipulated time	M	1	Incident/ Near Miss Records
1g	Carrying out Inspections and submission of Inspection reports within stipulated time	M	1	Inspection Records
1h	Regular Job Specific Training ensured for High Risk Workers (through audio-visual medium) as per plan	M	1	Training & Attendance Records
2a	Whether the contractor is registered under BOCW	M	2	BOCW Registration Certificate
2b	Availability of Qualified safety officer (1 for every 500 labour)	M	2	Safety Officer qualification & experience records
2c	Availability of Qualified safety supervisor (1 for every 100 labour)	M	2	Safety Officer qualification & experience records
2d	All the workers are provided and using safety helmets and safety shoes/gum boots	M	2	PPE Issue Records, Inspection/ non-conformity records
2e	Housekeeping done on regular basis and scrap removal at site	M	1	Housekeeping records, Inspection/ non-conformity records
2f	Usage of Goggles/Face shields and Hand gloves for gas cutter and grinders		1	PPE Issue Records, Inspection/ non-conformity records
2g	Wall openings & floor openings are guarded?		1	Inspection/ non-conformity records
2h	Adequate illumination provided in all working area?		1	Inspection/ non-conformity records
2i	Safety posters, sign boards and emergency contact numbers in all prominent location are displayed?		1	Inspection/ non-conformity records
2j	Availability of automatic reverse horns, Main horn, hook latches for Vehicles, mobile cranes, Hydras		1	Inspection/ non-conformity records
2k	Ban of carrying mobile phones to work place is implemented for workers		1	Inspection/ non-conformity records
2l	Availability of Tags & Inspection Certificates for Cranes of all capacities		1	Master T&P List with internal & external test details
2l.2	Availability of Tags & Inspection Certificates for Winches of all capacities		1	Master T&P List with internal & external test details
2l.3	Availability of Tags & Inspection Certificates, color coding for Chain pulley blocks		1	Master T&P List with internal & external test details
2l.4	Availability of Tags & Inspection Certificates for Vehicles - Trailers, Dozers, Dumpers, Excavators. Mixers etc.		1	Master T&P List with internal & external test details
2l.5	Availability of Tags & Inspection Certificates for Welding machines, grinders, Drilling machines, etc.		1	Master T&P List with internal & external test details
2l.6	Availability of Tags & Inspection Certificates, colour coding for Wire rope slings etc.		1	Master T&P List with internal & external test details
2l.7	Availability of Tags & Inspection Certificates for Batching plants		1	Master T&P List with internal & external test details

SL	Parameter for Measurement	M/ O	Wt	Supporting Documents
2m.1	Use of Lifting Permit as per requirement		1	Permit Records
2m.2	Use of Height Permit as per requirement		1	Permit Records
2m.3	Use of Hot Work Permit as per requirement		1	Permit Records
2m.4	Use of Excavation permit as per requirement		1	Permit Records
2m.5	Use of Confined space work permit as per requirement		1	Permit Records
2m.6	Use of Grating removal and safety net removal permit as per requirement		1	Permit Records
2m.7	Use of Lockout-Tag out permit as per requirement		1	Permit Records
2m.8	Use of Radiography permit as per requirement		1	Permit Records
2m.9	Use of Night/ Holiday Work Permit as per requirement		1	Permit Records
2m.10	Use of Any other Applicable Permit as per requirement		1	Permit Records
3a	Material safety data sheet(MSDS) available for all chemicals and displayed in usage and storage area?		1	Inspection/ non-conformity records
3b	Spillages of oil/concrete and other chemical is controlled and cleaned by proper method in case of spill?		1	Inspection/ non-conformity records
3c	Availability of adequate number of urinals in workplace and in elevations and maintained	M	1	
3d	Availability of rest rooms for workers at site	M	1	
3e	Availability of Drinking water facility at work spot		1	
3f	Hygienic Labour colony is provided for workers.		1	
4a	Is heavy/complex critical lifting permit obtained for heavy, complex materials before handling/erection activity?		1	Work Permit records
4b	Whether area below lifting activities barricaded		1	Inspection/ non-conformity records
4c	Availability of experienced rigging foreman		1	Experience details of rigging foreman
4d	Is agency is following proper storage and handling procedure as per manufacturer standard for all hazardous material?		1	Procedure for storage & handling
4e	Are oxygen and acetylene cylinders are transported to work place from storage area in trolleys		1	
5a	Whether all deep excavation has been protected by barrier		1	Inspection/ non-conformity records
5b	Sloping/benching & shoring provided for excavation as per requirement?		1	-do-
5c	Proper access and egress provided for excavations?		1	-do-
5d	Blasting is done in controlled manner?		2	-do-
6a	Whether Electrical booth is equipped with Co_2 fire extinguishers and fire buckets filled with sand?		2	Inspection/ non-conformity records
6b	Availability of Illumination lamp in electric booth?		1	-do-
6c	whether Caution Boards have been displayed?		1	-do-
6d	Usage of Metal Plug top for all hand power tools ?		1	-do-
6e	Usage of Insulated welding cables.		1	-do-
6f	Electrical Booth/Distribution Board to be covered by proper Canopy.		1	-do-
6g	Availability of functional & individual 30ma ELCB / RCCB and MCB for protection and conducting periodical check-up?		1	-do-
6h	Double earthing for panel boards and all machinery & proper earth pit with regular inspection available?		1	-do-
6i	Whether Electrician is qualified and experienced		1	Qualification & Experience records of electrician
6j	Availability and usage of Rubber hand gloves by electrician?		1	Inspection/ non-conformity records

SL	Parameter for Measurement	M/ O	Wt	Supporting Documents
7a	Whether Scaffolding pipes made with steel or aluminum, are being used and checked periodically by experienced/ certified scaffolder?		2	Inspection/ non-conformity records
7b	8mm Stainless Steel wire rope with plastic cladding is provided for life line (Vertical / Horizontal) during height work?		2	-do-
7c	Availability of emergency lighting in case of power failure		1	-do-
7d	Whether all the openings are covered with Safety Nets made of fire proof Nylon?		1	-do-
7e	Whether MS pipe rails around staircases & platforms in usage are provided with top, middle rails and toe guard ?		1	-do-
7f	Whether Ladder with vertical life line /Fall arrestor is available to climb?		1	-do-
7g	Whether all workers deployed for working at height have been issued height pass after undergoing vertigo test?		1	Height Pass records
7h	Whether all workers deployed for height work / climbing ladder are provided and using Double lanyard safety belt?		1	PPE Issue records, inspection/ non-conformity reports
7i	Is all hand tools/Small material used by height workers is tied firmly to prevent fall?		1	-do-
8a	Flash back arrestors for all gas cutting sets is available on Torch side and cylinder side		1	Inspection/ non-conformity records
8b	Oxygen/Acetylene/LPG cylinders not in use have caps in place and stored separately?		1	-do-
8c	Availability of Face screen, Hand gloves, and Apron, for welders		1	-do-
8d	Protection from falling hot molten metal during metal cutting / welding at height by providing GI sheet below the cutting area especially in fire prone areas		1	-do-
9a	Pre-employment medical check-up done for all workers and submitted?		1	Medical check records
9b	Availability of first aid center, with MBBS doctor(Own or Sharing basis)	**M**	2	Attendance records
9c	Availability of Ambulance facility 24 hours (Own or sharing basis)	**M**	2	-do-
9d	Is First aid trained personnel's are available and their names are displayed at site?	**M**	1	-do-
9e	Availability of Emergency vehicle at site		1	
9f	Periodical medical check-up is conducted for all the workers and submitted?		1	Medical check records
9g	Availability of sufficient number of first aid box as per standard list and maintaining record		1	Inspection records
10a	Availability of Fire extinguishers, buckets at all vulnerable points		2	Fire extinguisher records
10b	Periodic fire mock drill conducted?		1	Fire, Mock drill records
10c	Are all flammable materials are stored separately?		1	
10d	Periodic grass cutting is done in material storage area?		1	
10e	Availability of 24V DC lighting in confined space work area		1	
10f	Availability of exhaust fan in confined space work area		1	

Note:

- **M: Mandatory; O: Optional**. Points other than mandatory can be excluded with appropriate justification (scope etc.) by BHEL
- Additionally: 30 Marks for each Fatal Accident and 10 mark for each major accident shall be deducted.

SECTION-B

Special Requirements

1. **Establishment of Common Facilities for whole Project –** cost to be borne in full by subcontractor.

Table 1.1

S. No.	Item	Details as per Clause No. of this Section	Applicable / Not Applicable with Remarks	Package
1	Construction of Medical Centre	a	Applicable	Civil
2	Construction of Worker Training Centre (A part of safety park)	b	Applicable	Civil
3	Construction of Vertigo Test Structure (A part of safety park)	c	Applicable	Civil
4	Deployment of Specialists	d	Applicable	By concerned agencies
5	HSE Equipment	e	Applicable	By concerned agencies
6	HSE measurement devices	f	Applicable	By concerned agencies
7	Urinals in under-construction structures	g	Applicable	By concerned agencies
8	Safety Park	h	Applicable	Civil

Note: Construction of Safety Park with allied infrastructure, is only applicable in those new projects of BHEL-PSER, where there is no established safety park.

a. MEDICAL CENTRE

i. A medical center shall be setup at site with basic facilities for handling medical emergencies

ii. Deployment of Medical Professional:
   1. **A qualified medical professional shall be deployed at site at all times.**
   2. **When total employee & worker strength at site crosses 500, medical professional with MBBS Degree from recognized institute shall necessarily be deployed**

iii. Ambulance shall be deployed along with a trained driver and accessories as per Schedule V of BOCW Central Rules, 1998. Ambulance shall be utilized exclusively for transporting the accident victim. Ambulance drivers shall be regularly trained in First Aid.

iv. Non deployment of Ambulance and First Aider as above shall invite a penalty of Rs. 30000 pm and Rs10000 PM respectively

v. Medical waste shall be disposed as per prevailing legislation (Bio-Medical Waste – Management and Handling Rules, 1998).

vi. Above are bare minimum requirements. Any legal requirements over and above these specifications shall supersede the above requirements

b. WORKER TRAINING CENTRE

i. Indoor Worker Training Center to be developed at site with seating capacity of at least 50 trainees

ii. Projector with following minimum specifications:

Native Resolution	XGA, 1024x768
Brightness (ANSI lumens)	3300
Contrast Ratio	13000:1
Display Color	30 Bits
Aspect Ratio	4:3

iii. A Laptop or Desktop PC with following minimum specifications:

Processor	Intel Celeron Dual Core
Memory (RAM)	2 GB
Graphics Card	2GB Video Memory
Hard Disk Capacity	60 GB
Monitor Size	14 inches
Keyboard	
Mouse	

iv. Stereo speakers with minimum 50W RMS sound output

v. PA system for Addressing Workers

vi. Seating arrangement

c. Development of Vertigo Test Structure:

Vertigo test Structure to be developed as per **Annexure 04**

d. Specialists:

Following specialists shall be deployed by the subcontractor, who shall cater to whole project as per BHEL requirements / instructions

I. **Qualified T&P Inspector: subcontractor** shall engage one qualified T&P inspector having undergone a certification course in the discipline.

II. **Qualified Scaffolding Erector and Inspector:** Subcontractor shall deploy one qualified Scaffolding Supervisor and Inspector having undergone a certification course in the discipline

e. **Tools & Equipment:** Following equipment conforming to relevant IS Codes for the job shall be ensured by subcontractor:

S. No.	Item
1	Lifelines
2	Retractable Fall Arrestors
3	Safety Nets (10m X 5m)
4	Sky Climbers
5	Fire Blanket
6	Honey Bee Removal Suit & Kit
7	Flashback Arrestors
8	Barricading Tape
9	Binoculars
10	Walkie-Talkies
11	LOTO kit
12	24-Volt light
13	Sand Buckets
14	Hard barricading planks
15	Standby Fire kits

S. No.	Item	Type of Job / Purpose	Remarks
1	Lifelines (Steel Rope) and posts	Height work	
2	Retractable Fall Arrestors	Height Work	
3	Safety Nets (for fall protection; railings also to be covered)	Height Work	
4	Sky Climbers	Height Work	
5	Fire Blanket, Spark/ slag collector	Hot Work	
6	Honey Bee Removal Suit & Kit	General	
7	Flashback Arrestors	Hot work	
8	Barricading –Hard (Scaffolding Pipes & Clamps or fabricated using structural/round	Height Work, Excavation, General Barricading	
9	Binoculars	HSE Inspection	
10	Walkie-Talkies	Lifting	
11	LOTO kit	Working on charged line	
12	24-Volt light	Confined Space/ temp work	
13	Sand and Water Buckets	Hot work/Electrical work	
15	Standby Fire kits Fire extinguisher stands	Hot work/Electrical work	

Above equipment are bare minimum to be essentially maintained at all times. Additional numbers to be deployed as and when required in order to ensure fulfillment of all Safety requirements

f. HSE Measurement Equipment & Tools

S. No	Device
1	ELCB Tester
2	Multi meter (Light cables)
3	Earth Resistance Meter
4	Lux Meter
5	Decibel Meter
6	Anemometer
7	Breath Analyzer (Alcohol)
8	Multi-gas analyzer
9	Gas leakage detector / alarm
10	Gas monitor (confined space)
11	Radiation meter & Badges
12	Blood pressure monitor
13	Fire detectors
14	Dust Particle Detector

g. Urinals in Under-construction structures:

Urinals for in under-construction structures for easy access eg. In case of Boiler elevations etc.

2. **Shared Facilities –** where part of operating cost is borne by subcontractor in proportion to contract value

The subcontractor shall bear running expenses of above facilities on a 'proportional to contract value sharing basis as finalized by BHEL.

S. No.	Facility
1.	Operation of Ambulance, Nurses, Medical Consumables
2.	Construction, Maintenance & Upkeep of Latrines and Urinals in Common spaces
3.	Drinking Water Provision in Common Spaces
4.	Dust Control / Water Sprinkling, Pest Control, Fumigation at Site

LIST OF REFERENCES

S. No	Code Name	Title
1	IS: 818-1888 (Reaffirmed 2003)	Code of Practice for Safety and Health requirements in Electric and Gas Welding and Cutting operations.
2	IS: 1179-1967 (Reaffirmed 2003)	Specification for Equipment for Eye & Face protection during welding.
3	IS: 1989 (Part 2):1986 (Reaffirmed 1997)	Specification for Leather Safety Boots & Shoes
4	IS:2925 – 1984 (Reaffirmed 2010)	Specification for Industrial Safety Helmets
5	IS:3521: 1999 (Reaffirmed 2002)	Industrial Safety Belts & Harnesses-Specification
6	IS:3646(Part II) – 1966(Reaffirmed 2003)	Code of Practice for Interior Illumination
7	IS:3696 (Part I) – 1987 (Reaffirmed 2002)	Safety Code for Scaffolds and Ladders
8	IS: 3696(Part 2) : 1991 (Reaffirmed 2002)	Scaffolds and Ladders-Code of Safety
9	IS: 3764:1992	Excavation Work – Code of Safety
10	IS:3786 – 1983 (Reaffirmed 2002)	Method for Computation of Frequency and Severity Rates for Industrial Injuries and Classification of Industrial Accidents
11	IS.4014.2.1967	Steel tubular Scaffolding
12	IS:4770: 1991 (Reaffirmed 2006)	Rubber Gloves Specification (Electricals Purposes)
13	IS:4912: 1978 (Reaffirmed 2002)	Safety Requirements for Floor and Wall Openings, Railings and Toe Boards
14	IS: 5557 – 1969	Industrial and Safety rubber knee boots.
15	IS: 5983 – 1980 (Reaffirmed 2002)	Specification for Eye-Protectors
16	IS:6519 – 1971 (Reaffirmed 1997)	Code of Practice for Selection, Care and Repair of Safety Footwear
17	IS.6549.1972	Glossary of terms used for Lifting tackles
18	IS:6994(Part I)-1973 (Re affirmed 1996)	Specification for Industrial Safety Gloves Leather and Cotton Gloves
19	IS.7215.1974	Steel Structure Fabrication
20	IS.7969.1975	Handling and storage of building material

21	IS:8519 – 1977 (Reaffirmed 1983)	Guide for Selection of Industrial Safety Equipment for Body Protection.
22	IS:8520 – 1977 (Reaffirmed 2002)	Guide for Selection of Industrial Safety Equipment for Eye, Face and Ear Protection.
23	IS:9167:1979	Specification for Ear-Protectors
24	IS:9473:2002	Respiratory Protective Devices-Filtering Half Masks to protect against Particles-Specification.
25	IS: 9944:1992 (Reaffirmed 2003)	Natural and Man-made Fiber Rope Slings- Recommendations on Safe working loads.
26	IS 11006 : 2011	Flash Back(Flame) Arrestor Specification
27	IS: 11226 – 1985	Leather Safety footwear having direct molding sole.
28	IS:11057 – 1884 (Reaffirmed 2001)	Specification for Industrial Safety Nets
29	IS: 12254:1993 (Reaffirmed 2002)	Polyvinyl Chloride (PVC) Industrial Boots Specification
30	IS:13367(Part 1):1992 (Reaffirmed 20030	Safe Use of Cranes-Code of Practice
31	IS: 14166:1994 (Reaffirmed 2002)	Respiratory Protective Devices-Full Face Masks Specification
32	IS:14746: 1999 (Reaffirmed 2003)	Respiratory Protective Devices-Half Masks and Quarter Masks - Specification
33	IS: 15397 :2003 (Reaffirmed 2008)	Portable Extinguisher Mechanical Foam Type(Stored Pressure)-Specification
34	IS: 19011:2002	Guidelines for Quality and/or Environmental Management Systems Auditing

As per Contract Labor (Regulation & Abolition Act), Central Rules, 1971,

(1) The first-aid box shall be distinctively marked with a Red Cross on a white background and shall contain the following items, namely:

(a) For establishments in which the number of contract laborers employed does not exceed fifty, each first aid box shall contain the following equipment:

(i)	6 small sterilized dressings
(ii)	3 medium size sterilized dressings
(iii)	3 large size sterilized dressings
(iv)	6 pieces of sterilized eye pads in separate sealed packets.
(v)	6 roller bandages 10 cm wide.
(vi)	6 roller bandages 5 cm wide.
(vii)	One tourniquet
(viii)	A supply of suitable splints
(ix)	Three packets of safety pins.
(x)	Kidney tray.
(xi)	3 large sterilized burn dressings.
(xii)	1 (30ml) bottle containing a two percent alcoholic solution of iodine
(xiii)	1 (30 ml) bottle containing Sal volatile having the dose and mode of administration indicated on the label
(xiv)	1 snake bite lancet
(xv)	1 (30gms) bottle of potassium permanganate crystals.
(xvi)	1 pair scissors
(xvii)	1 copy of the First-Aid leaflet issued by the Director General, Factory Advice Service and Labor Institutes, Government of India.
(xviii)	A bottle containing 100 tablets (each of 5 grains) of aspirin
(xix)	Ointment for burns
(xx)	A bottle of suitable surgical anti-septic solution

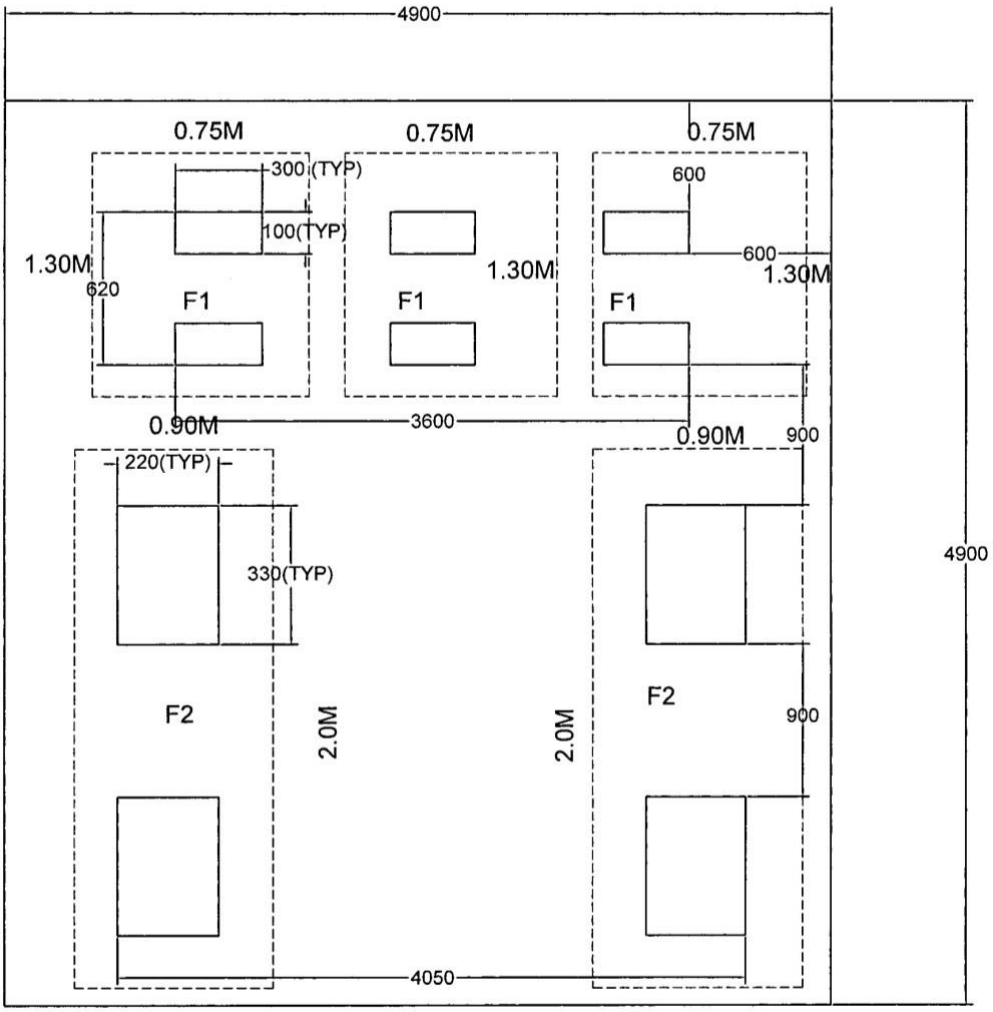
Details and Contents of First Aid Box

(b) For establishment in which the number of contract laborers exceeds fifty each first-aid box shall contain the following equipment:

(i)	12 small sterilized dressings
(ii)	6 medium size sterilized dressings
(iii)	6 large size sterilized dressings.
(iv)	6 large size sterilized burn dressings
(v)	6 (15 grams) packets sterilized cotton wool
(vi)	12 pieces of sterilized eye pads in separate sealed packets.
(vii)	12 roller bandages 10 cm wide.
(viii)	12 roller bandages 5 cm wide.
(ix)	One tourniquet.
(x)	A supply of suitable splints.
(xi)	Three packets of safety pins.
(xii)	Kidney tray.
(xiii)	Sufficient number of eye washes bottles filled with distilled water or suitable liquid clearly indicated by a distinctive sign which shall be visible at all times.
(xiv)	4 per cent Xylocaine eye drops, and boric acid eye drops and soda by carbonate eye drops.
(xv)	1 (60ml) bottle containing a two percent alcoholic solution of iodine
(xvi)	One (two hundred ml) bottle of mercurochrome (2 per cent) solution in water.
(xvii)	1 (120ml) bottle containing Sal volatile having the dose and mode of administration indicated on the label.
(xviii)	1 roll of adhesive plaster (6 cmX1 meter)
(xix)	2 rolls of adhesive plaster (2 cmX1 meter)
(xx)	A snake bite lancet.
(xxi)	1 (30 grams) bottle of potassium permanganate crystals.
(xxii)	1 pair scissors
(xxiii)	1 copy of the First-Aid leaflet issued by the Director-General, Factory Advice service and labor Institutes, Government of India.
(xxiv)	a bottle containing 100 tablets (each of 5 grains) of aspirin
(xxv)	Ointment for burns
(xxvi)	A bottle of a suitable surgical anti septic solution.

(2) Adequate arrangement shall be made for immediate recoupment of the equipment when necessary.

Table 1	
S. No.	**Topic**
1	**Vertigo / Height working Test Structure Layout**
2, 3	**Structure Layout Sketch**
3	**Actual Photo of a typical structure**
4	**Bill of Materials**
5	**Guidelines for Conducting the Test**



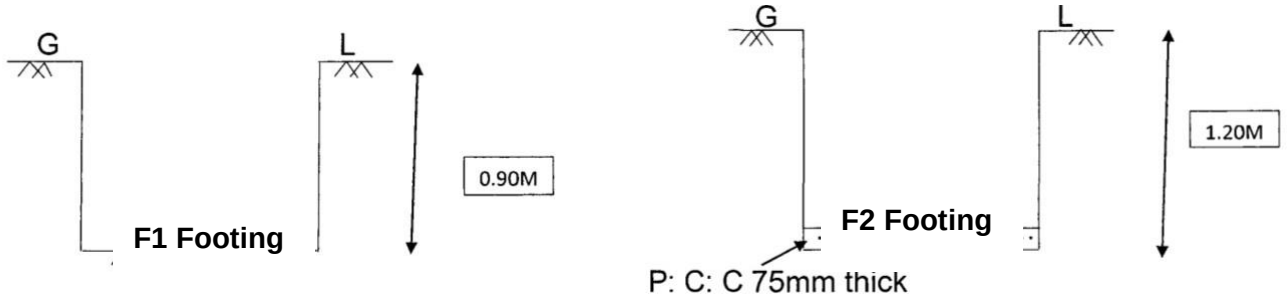
Note:

- All dimensions are in mm
- Drawing is not to scale
- Inside boundary area to be filled with sand to level with road (external)
- Details of F1 and F2 are shown below

Figure 1: Vertigo / Height Work Test Structure Layout

HSEP:14 - ANNEXURE 04

Vertigo Test Structure Specifications



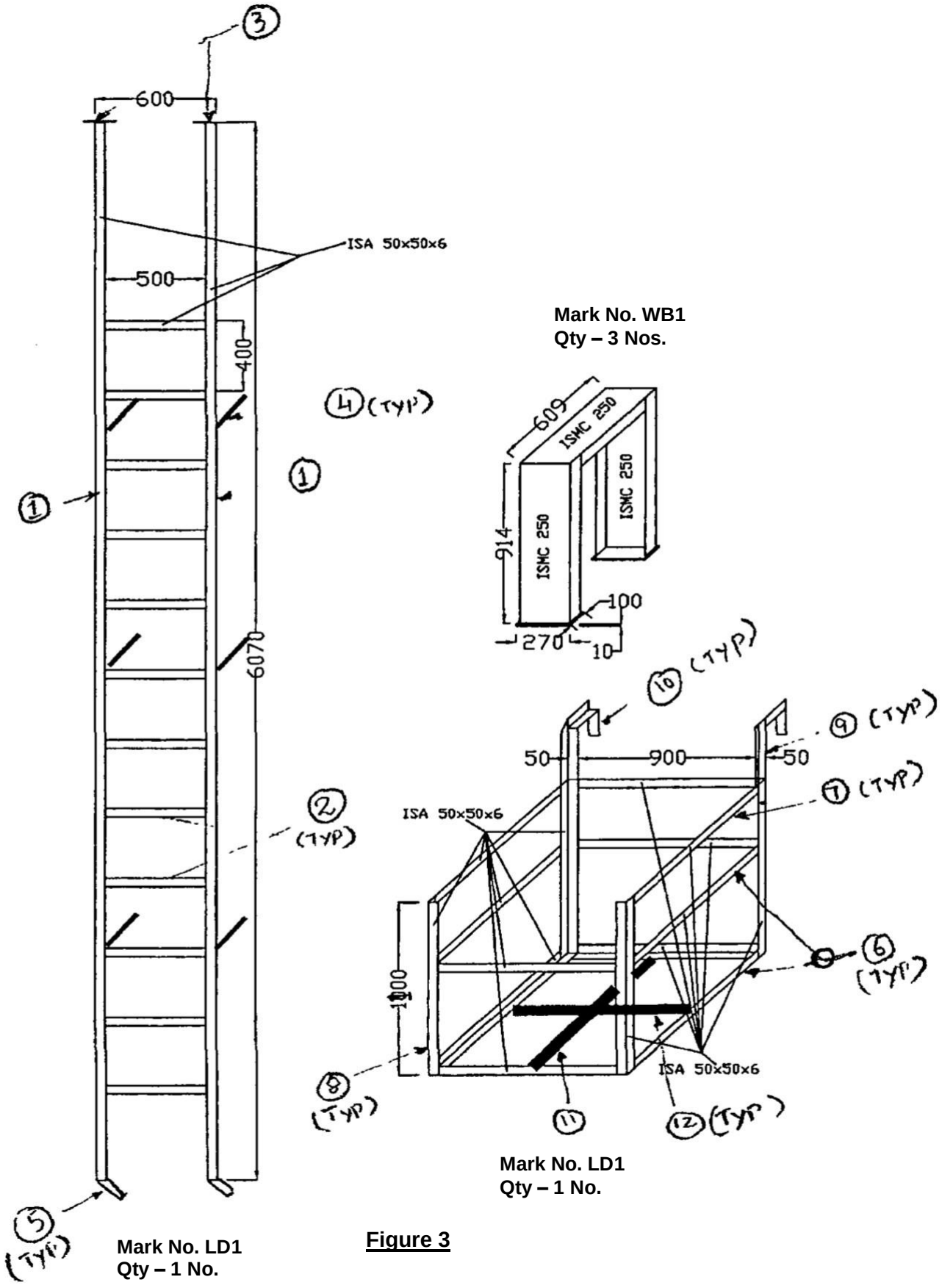
Note:

- Concrete Grade is M15
- Drawing is not to scale
- TOC is at Road Level
- G L refers to Ground Level

Figure 2

HSEP:14 - ANNEXURE 04

Vertigo Test Structure Specifications



Mark No. WB1
Qty – 3 Nos.

Mark No. LD1
Qty – 1 No.

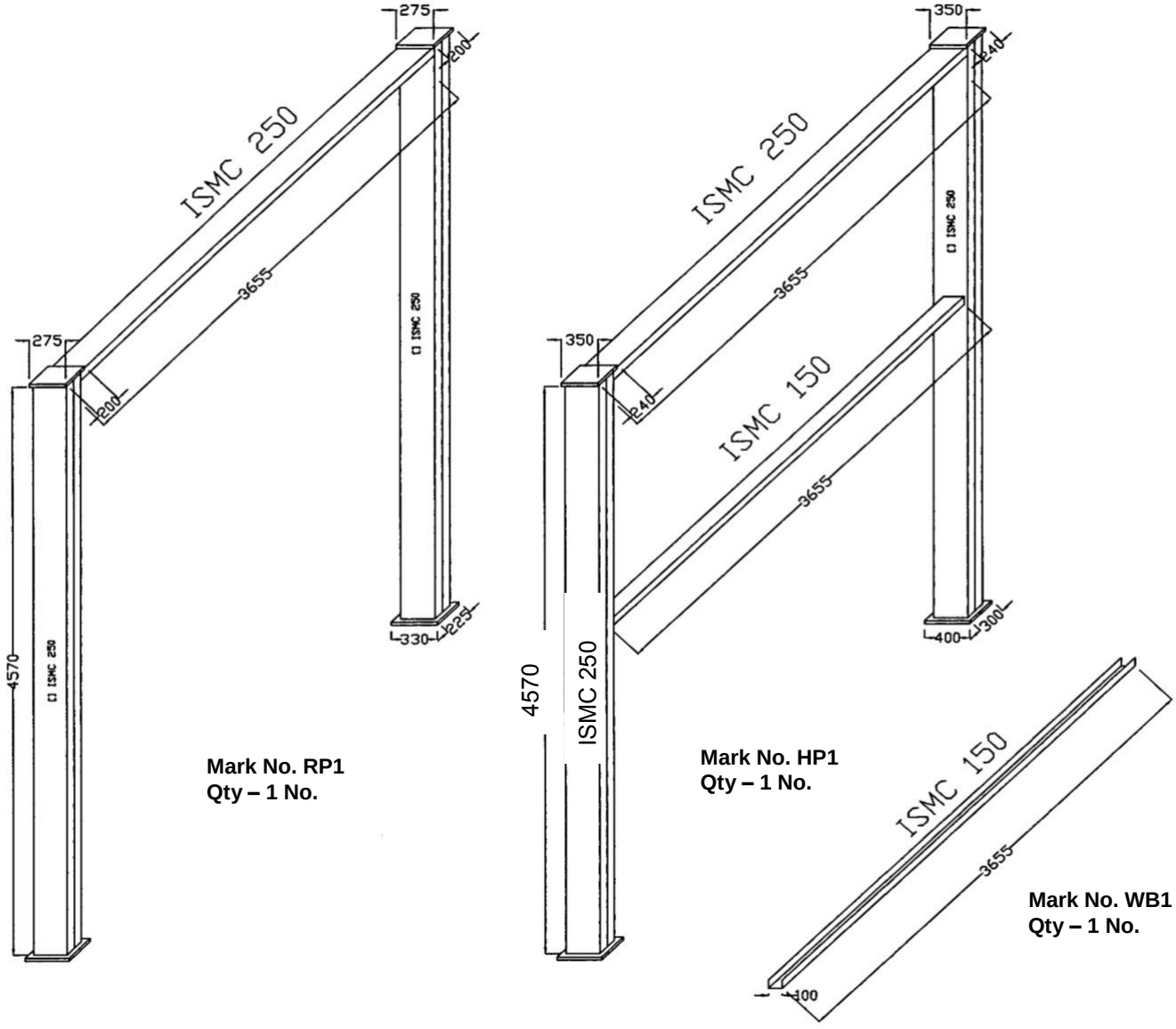
Mark No. LD1
Qty – 1 No.

Figure 3

HSEP:14 - ANNEXURE 04

Vertigo Test Structure Specifications

Figure 4



Mark No. RP1
Qty – 1 No.

Mark No. HP1
Qty – 1 No.

Mark No. WB1
Qty – 1 No.



Pic-1: Actual Photo of a Typical Vertigo Test

Table 2: BOM FOR HEIGHT WORK INDUCTION TRAINING MODULE						
Sl. No.	**Description**	**Width (mm)**	**Length (mm)**	**Qty (No's)**	**Unit Wt (Kgs)**	**Total Wt. (Kgs)**
MKD NO. WB1						
1	ISMC250		609	3	34.20	62.483
2	ISMC250		914	6	34.20	187.553
3	ISMC100		3655	1	9.56	34.942
4	PL10	100	270	6	78.50	12.717
			Total Weight (Kgs)			**297.695**
MKD NO. RP1						
1	ISMC250		4570	4	34.20	625.176
2	ISMC250		3655	1	34.20	125.001
3	PL25	225	330	2	196.25	29.143
4	PL25	200	275	2	196.25	21.588
			Total Weight (Kgs)			**800.908**
MKD NO. HP1						
1	ISMC250		4570	4	34.20	625.176
2	ISMC250		3655	1	34.20	125.001
3	ISMC150		3655	1	16.80	61.404
4	PL25	300	400	2	196.25	47.100
5	PL25	240	350	2	196.25	32.970
			Total Weight (Kgs)			**891.651**
MKD NO. LD1						
1	ISA50X50X6		6070	2	4.50	54.630
2	ISA50X50X6		500	12	4.50	27.000
3	PL12	75	75	2	94.20	1.060
4	ISA50X50X6		300	6	4.50	8.100
5	ISA50X50X6		255	2	4.50	2.295
6	ISA50X50X6		1000	8	4.50	36.000
7	ISA50X50X6		910	3	4.50	12.285
8	ISA50X50X6		1100	4	4.50	19.800
9	ISA50X50X6		650	2	4.50	5.850
10	ISA50X50X6		350	2	4.50	3.150
11	PL8	75	900	1	62.80	4.239
12	PL8	75	410	2	62.80	3.862
			Weight (Kgs)			**178.271**
			Total Weight (Kgs)			**2168.525**

A. Test Procedure / Guidelines

Fear of height may be physiological or psychological. Therefore, to rule out any possibility of physiological factor, detailed medical check-up of workers is carried out before vertigo test. Medical check-up of workers includes the following:
history of past illnesses (like epilepsy, drug allergy, diabetics/ hypertension, unconsciousness etc.), general physical examination (like height, weight, BMI, build and nourishment etc.), measurement of pulse rate, Blood Pressure, respiratory rate.
After this check-up, those who are found suitable for height work by examining doctor, are allowed to undergo vertigo test.
During this health check-up, psychology of workers is also studied. If any worker finds it extremely difficult/ frightening to climb the monkey ladder & walk on the beam, during/after performing vertigo test or even before performing, then he is treated as disqualified.
As per standard, during vertigo test, worker is allowed to climb on a foundation through monkey ladder, walk on a beam, then steps down at the other end of beam, through monkey ladder. Height of the beam should be at least six feet from ground level. All necessary safety precautions are taken during this test. Worker has to wear full body harness with double lanyard. A horizontal lifeline is run parallel to the beam and worker has to put his lanyards into the lifeline. Additionally, a safety net is also put below the beam for rescue of the victim in case of a fall from beam.
Following activities are generally carried during testing:

1. **Walking Bench Training:**
   a. Person should walk over the channel. He should maintain balance & walk without much problem.
   b. If the person has problem to balances himself on repeated chances, he may be having flat foot or some other problem. So, he may not be fit for height work.
2. **Rope Climb Training:**
   Person should be able to climb the rope up to the top channel for ensuring that in case of fall, a person hanging on the safety harness, will be able to safely climb back to the platform within minimum time period before the safety harness start breaking down under the load.
3. **Height Work Training:**
   Person should walk freely on the middle channel while holding the top channel with the help of safety harness.
4. **Ladder for Vertical fall arrestor Training:**
   Vertical fall arrestor rope is fixed from top to bottom of the ladder. It will ensure:
   - Usage of vertical fall arrestor.
   - Usage of two lanyards of a safety harness.
   - Ensure 3-point contact on the ladder while climb.
5. **Chair for work at height Training:**
   - Climb though vertical ladder with two lanyard ropes.
   - Hooking of two lanyard ropes to life line. With this safe arrangement, he can walk to chair.
   - Sits in the chair safely, comes out & walks back to the vertical ladder & come down from vertical ladder. After completion of vertigo test, blood pressure of worker is again measured. If it is not within acceptable limits for any worker, concerned worker is denied height pass.

Only those who pass the above training are fit for height work.

Safety Park Requirements

Sl. No.	Training room (capacity 40 persons)	Qty.
1	Class room chair	25
2	Office Table	3
3	Rolling chair	3
4	Almirah	1
5	Visitor chair	10
6	Drawer	2
7	Single bed	1
8	Mattress	1
9	Projector	1
10	Projector screen	1
11	Sound speakers	1
12	Desktop Computer	3
13	Printer	1
14	White Board	1
15	Marker	5
16	Duster	1
17	Door Mat	9
18	Dustbin (Small + BIG)	7+1
19	Mannequin	1
20	Helmet	1
21	Face Shield	1
22	Safety Goggle	1
23	Welding shield	1
24	Ear Muff	1
25	Ear Plug	1
26	Nose Mask	1
27	Breathing Apparatus	1
28	Hand Gloves (Cotton)	1
29	Hand Gloves for Electrician (Rubber)	1
30	Hand gloves Rubber	1
31	Hand Gloves Lather	1
32	Construction Safety Uniform (Boiler Suit)	1
33	Welding Apron	1
34	Safety Shoes	1
35	Leg Guard for Welder	1
36	Poster for Occupational Disease like Pneumoconosis, silicosis etc.	1

37	Gum Boot	1
38	Full Body Harness	1
39	8 MM Wire rope for life line. Length 20 Feet (FT).	1
40	Safety Net for man & materials. Size 15 FT X 15FT.	1
41	Monkey ladder 15 FT.	1
45	Fire Extinguisher All types(DCP,CO2 & Foam)	1
46	Bed Sheet	1
47	Pillow	1
48	Curtain	12
49	curtain fittings	12
50	AC (1.5 TON)	3
51	AC (2 TON)	2
52	Rope pully.	1
53	PP Rope for pully 20 MTR.	
54	Ladder Clamps	6
55	Aluminum ladder 6 MTR.	1
56	Carry Bag	
57	Scaffolding all Materials for 5 Mtr. Height like Scaffolding tubes, Sole plate, base plate, Right angle clamps, Swivel clamps, beam clamps, Joint box/joint pin, toe guard/board,	

RECORD OF REVISION

Clause No.	Rev. No.	Brief Description of Revision	Date
All	00	New Procedure Introduced	25.04.2019
All	01	OCPs-60, 61& 62 introduced, New formats introduced	08.05.2020

Health, Safety & Environment, Power Sector Headquarters

Bharat Heavy Electricals Limited

Regd. Office: BHEL House, Siri Fort, New Delhi – 110049, India

Website: www.bhel.com

BHEL	**OPERATIONAL CONTROL PROCEDURE**	**Doc. No.: HSEOCP: 61** **Rev. No.: 01** **Rev. Date: 01.06.2020** **Page 1 of 13**
OCP No. : 61	Resumption of Construction Activities After Lock Down and Prevention of Coronavirus Infection during Site Operations	

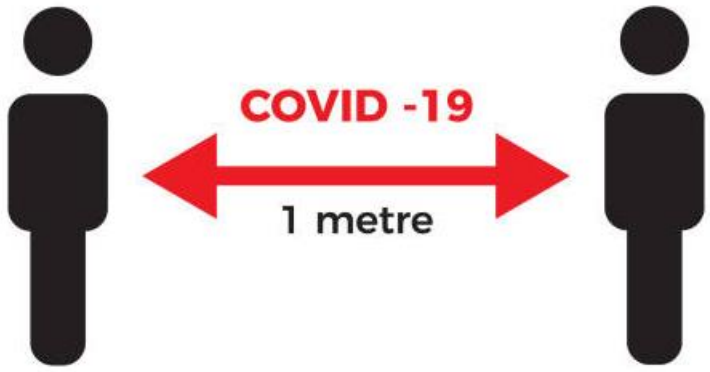
Purpose	➢ To resume work in a safe manner after Lock down due to COVID-19 Outbreak ➢ To ensure health & safety of personnel and prevention of infection during operations ➢ To ensure HSE Management & Control during operations	**Scope**	PS Regions
Background	➢ The purpose of this procedure is to resume construction works at BHEL project sites in the event of 'Construction activities' being permitted by the Government/District Administration/Statutory Authorities. ➢ By following this OCP the chain of corona spread will largely be contained and works can be done safely. ➢ All precautionary measures are to be ensured at site and labor colonies so that the labor force feels safe and secure at work place and act in a productive manner. ➢ This OCP also lays down guidelines to handle cases of infection		
Applicability	➢ This OCP applies to all BHEL employees and its subcontractors working at project sites. ➢ It also covers guidelines for medical personnel, security personnel, visitors and others		
Responsibility	Concerned Site In-charge / Site HSE Head/Package Head		
Performance Criteria	Number of cases of violations from these guidelines. All violations must be recorded and compliance for the same immediately/ within day		
References	➢ Corporate HSE Circular BHEL:CO: SOP: COVID-19 : 01 ➢ Corporate Guidelines regarding disinfection for Prevention of CQVID-19 in BHEL Offices, Townships, Hospitals, Factories and other common places (No. AA:HR:MR 1 (C) dated 20-03-2020) ➢ OHSAS : 18001 , ISO : 14001:2015, ISO 45001:2018 ➢ ICMR & WHO Guidelines for COVID 19 ➢ Govt. of India Guidelines being issued from time to time ➢ Guidelines issued by National Centre for Disease Control and other agencies of Govt. of India ➢ WHO Guidelines being issued from time to time		

Prepared by	Reviewed by	Approved By
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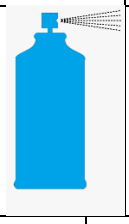
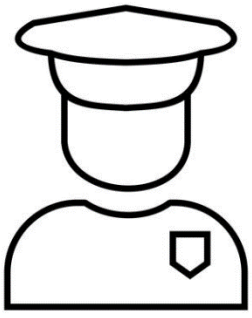
BHEL	**OPERATIONAL CONTROL PROCEDURE**	**Doc. No.: HSEOCP: 61** **Rev. No.: 01** **Rev. Date: 01.06.2020** **Page 2 of 13**
OCP No. : 61	Resumption of Construction Activities After Lock Down and Prevention of Coronavirus Infection during Site Operations	

General PPEs & Precautions

Maintain Social Distance of at least 1 meter **Minimum (more the better)**



Precautions at all times is necessary. Even a single lapse can lead to infection

	Face shield/ mask must be worn by all at all times and disposed/ cleaned properly		Protective clothing must be worn		Protective gloves as identified in Safety Data Sheet
	Appropriate footwear with substantial uppers must be worn		Mandatory requirements are specified and must be followed. Report any accidents.		
	Spray to disinfect personal items/ areas		Spray to disinfect public places/ infrastructures/ tools etc.	Strictly No Shaking Hands	
	Hazmat suits and special PPEs for medical personnel and other officials with more probability of coming into contact with infected		Strict security & control at Gate to avoid entry into site/office premises of infected persons and persons without necessary PPEs, unauthorized personnel, animals etc.		

General

1. This procedure is applicable for all personnel working at Project Site, including staff, workers, officials, medical and security personnel, cleaners, housekeeping staff etc. It also includes visitors including drivers, cleaners, doctors, nurses, etc. entering the site premises
2. These are broad guidelines that may be followed in order to ensure the purpose of this OCP is met.
3. The procedure refers specifically to COVID-19 disease caused by SARS-CoV-2 Virus, but is applicable to similar highly infectious respiratory illnesses as well
4. This procedure is branches out of Corporate HSE Circular **BHEL: CO: SOP: COVID-19: 01 – 'Standard Operation Procedure for Work Resumption after Lockdown'**. In case of any ambiguity & duplicity, Corporate HSE Circular & Guidelines **and Govt. guidelines** to be followed
5. This procedure is necessary to ensure continuation of business operations in order to avoid mandatory lockdown due to an infection. All precautions to be taken seriously due to the contagiousness and mortality rate of this disease. Even a slight lapse can lead to infections and shut down of site operations for the mandatory notified period
6. The physical distancing guidelines of minimum 1 m indicated in this document to be reviewed in line with latest Govt. guidelines and ensured appropriately

Detailed Procedures & Controls are given below

Procedures and Controls		
S No	Activity	Responsibility
1	**Deployment/ Nomination of COVID Marshall** a. BHEL and Agencies shall nominate COVID Marshalls, who will be responsible for monitoring the COVID prevention measures and apprising management on the same. b. Every agency shall nominate COVID Marshall, who shall report to BHEL COVID Marshall c. BHEL COVID Marshall shall be nominated by Site In-charge in consultation with Site HSE Head. d. BHEL COVID Marshall shall be the Nodal COVID Marshall for the site, and having overall responsibility.	Agency, BHEL
2	**Directions for Newly Joining Workers/ Officials** a. Mandatory health check-up for every worker/ official joining the site b. An undertaking to be submitted by every worker/ official which shall specify if he/she had been in contact with a Covid-19 positive case, and other health-related details (as per **Format HSEOCP61-F01**) c. All newly joining workers/ officials, shall follow the applicable procedures/ guidelines as laid out by Govt./ statutory authorities pertaining to quarantine, prior to joining work	Agency, BHEL
3	**Routine HSE Management Activities During COVID-19** a. Due to the stress on existing medical facilities due to COVID-19 pandemic, it is imperative to take utmost precautions and avoid any incidents during operations. b. All activities to be carried out in safest manner possible with all necessary precautions. c. All activities to be carried out using least amount of paperwork and physical proximity as far as possible. The methodology to issue Permit etc. can be decided by Site Management. All necessary precautions before starting activity to be ensured and regularly monitored by concerned execution and HSE Team.	Agency, BHEL

	d. As far as possible, meetings & classroom trainings to be avoided. Essential meetings can be carried out by following the relevant guidelines e. **HSE Observer** App to be used to monitor HSE Activities and follow up with agencies for closure of non-conformities. Follow up can also be carried out through Phone/ Video Call etc. **f.** Apart from monitoring of HSE requirements, monitoring of COVID-19 precautions by workers and BHEL and Agency Officials also to be carried out	
4	<u>Strict Control at Gates</u> **a. Strict Control at the Gate/ Banning Entry to Anyone Not Wearing Masks** i. Security personnel at the gate may erect a barricade preferably approx. 10 meters from the gate and only allow personnel who are wearing proper masks inside. ii. Public address system may be used to warn any non-compliant visitors iii. Near entry gate, round markers at minimum 1-meter distance to be ensured so that distancing is ensured iv. A hand-wash or hand sanitiser facility is preferable at the gate to allow entry after hand wash or hand sanitisation. These are also to be provided at key locations to enable hand wash / hand sanitisation before starting work, before eating, etc. v. Gutkha, Paan, tobacco etc. to be banned from the site. Spitting to be strictly prohibited. **vi. Screening at Gate with Contactless Thermometer & Action on Suspected Cases** 1) Security Personnel at the Gate to screen each person entering the premises using a non-contact infrared thermometer, which is duly serial numbered and calibrated. 2) In case any site worker/ official is found to have fever more than 99 Degrees Fahrenheit or found coughing/ sneezing, he/she may be advised rest till recovery and entry to be permitted after obtaining clearance from medical officer/assistance/attendants. b. Any parcel/courier person should be stopped at gate only. Parcel to be collected from gate by concerned person preferably with provision of Special Box (wood/metal/plastic or the like) that can be sanitized daily. A provision of drop box at front of BHEL site office may also be deployed for receiving document like letter/invoice, etc. Parcels to be properly sanitized prior to opening. c. Any construction material received at site, unless properly sanitized, to be kept undisturbed for at least 3 days and to be used only after that period. d. Don't allow any new vehicle without concerned BHEL engineer permission. e. Ensure that number of persons coming inside and going outside is matching, agency wise. f. Visitor entry in site office to be avoided as far as possible.	Security, Agency, BHEL
5	<u>Maintaining Strict Social Distancing during site/office activities – minimum 1 meter distance between any two personnel</u> <u>to be Enforced Strictly</u> **a. During meetings, classroom training programmes like induction training and on-the job training, toolbox talks and other gatherings, following precautions may be ensured:** i. Preferably, such meetings to be avoided and communication carried out through other means (email, phone, pamphlets etc.) ii. At door, hand sanitizer or soap and water to be ensured for sanitizing hands during entry & exit by each individual iii. Only limited number of personnel to be called in training/ meeting, so as to ensure distance of minimum **1 meters** between two participants iv. Each participant to wear mask	Agency/ BHEL

	v. In case any individual is symptomatic/ coughing/ sneezing, he/ she may be taken to quarantine area by the medical/ first aid personnel, and medical assistance sought from specialized hospital, etc vi. Persons may be allowed to attend the induction training/ meeting only after temperature screening if felt necessary. **b. Social Distancing During Toolbox Talks** During Toolbox Talks, minimum 1 meter distance between any two workers to be ensured **c. During site execution activities:** i. For all site execution activities, social distancing is to be maintained. In case this is not possible due to nature of work, speciality of work, etc, ensure sensitisation of the labour/staff involved and use of appropriate PPEs, especially mandatory face mask. In any case, close working to be allowed only in special circumstances and ensuring these activities are preferably time staggered to the extent possible ii. Ensure hand wash / hand sanitisation facility at key places and these are topped up regularly **d. In office premises:** i. Sharing of items like pens, water bottles etc. in office premises to be avoided ii. Seating arrangement to be ensured to ensure minimum 1 meter distance iii. Doors preferably to be in open condition to avoid contact iv. All common touch points to be regularly disinfected.	
6	Mandatory Face Masks for Everyone at All Times a. Face masks, and other necessary PPEs to be provided to all workers as per guidelines of Govt/ statutory authorities b. Those responsible for sanitation and cleaning of areas to be given coveralls **c. The Govt of India advisory available at following link gives details on how to prepare, use and clean such masks.** https://www.mohfw.gov.in/pdf/Advisory&ManualonuseofHomemadeProtectiveCoverforFace&Mouth.pdf i. The workmen/staff may use home-made masks/ "gamchha" (**गमछा**) provided they are used effectively and constantly. ii. All site personnel to wear masks as specified at all times except possibly while having lunch/ tea. During that period, a distance of minimum **2 meters** to be maintained between two persons. iii. Minimum two masks to be ensured for each person – one can be used and other washed. Daily washing with detergent is mandatory iv. Strict directions for usage, washing of mask to be given to workers and officials. Masks are not to be touched from outside, and are to be put in soap solution on reaching residential quarters. v. There must not be a sharing of face covers and a face cover must be used by only one individual vi. Regular awareness by way of posters or daily briefing to be provided regarding correct usage, handling, washing, disposal etc of face masks/*gamchhas*/cloth etc	Concerned Individual/ Supervisor

	d. Types of Masks and Use case scenarios i. Homemade/ Reusable Face Covers: 1) Such home/ self-made face covers may be preferably used by all personnel. In case they can arrange better masks, same may be allowed. 2) In any case, no person to be permitted in site premises without a mask. ii. Triple Layer Surgical Masks 1) These are disposable masks to be given to visitors/ used by workers and officials as per requirement. iii. N95 Masks 1) Medical, security, and other officials, who come into contact with large number of people during the course of the day to be given N95 Masks 2) In addition, infected personnel and who are suspected of infection to use specialized masks as indicated by doctor e. Minimum two sets of masks to be ensured with everyone so that one can be used while other is washed	
7	<u>Mask cleaning/ disposal</u> The Govt of India guidelines in above link also give details on how to wash and dispose the masks. Same to be followed. In addition, a. For re-usable masks, in labor colony, separate area for cleaning masks to be identified, wherein all workers to wash the masks using detergent and water b. Cleaning of masks and availability of backup to be ensured by officials as well. c. Safe disposal of Masks, Infected clothing, items etc. i. Each location to have separate bin for collecting used disposable masks and possibly infected items. ii. All these bins to be collected daily and disposed of by trained staff wearing proper PPEs	Concerned Individual, Agency, BHEL
8	<u>Provision of Food & Refreshments</u> a. Workers: Tea for workers may be avoided. In case necessary, strict social distancing to be ensured, besides hand washing. It is preferable to let the labour bring their own cups/glasses or else use of disposable paper based cups to be encouraged i. Tea cups may be arranged by the server and picked by worker in contactless manner. ii. Food for workers may be served in packets. iii. Preparation: Common food preparation to be carried out under strict hygiene with cooks wearing gloves and masks. A guard specifically to monitor the health of the cooks may be deployed, who can warn the management regarding any possible health issues. iv. At tea/ food distribution area, social distancing norms to be ensured b. Officials: A far as possible, home cooked food to be preferred. In case not possible, packed food to be delivered at each seat, prepared in hygienic fashion as above	Agency/ BHEL

9	<u>General Precautions in Site Areas</u> a. Workers to be instructed to maintain social distancing of minimum 1 m at all time (tool box meeting, tea time lunch time, gate entry time and drinking/service water area) b. Daily Tool Box Meeting to also include awareness about COVID 19 and precautionary measures to prevent spread. c. No other group meeting to be conducted preferably. d. Contractor to keep their working area clean and hygienic. Disinfectant spray/powders to be applied daily at common places (eating place, drinking water area, service water area and transport vehicles) e. All the workers during resting also, to maintain physical distance of at least 1 meter. Subcontractor has to disinfect the rest shelter at regular intervals. f. Subcontractor may keep sanitizer/hand wash in sufficient numbers at all common points. g. All hanging load must be inspected before starting work. A committee can be formed by each contractor to ensure all these pre start up inspections are done and submit the report to BHEL. h. Sanitizer may be kept at stair case entrance, lift entry point etc. Lifts to be avoided to the extent possible, and staircases preferred i. If any worker is found with COVID-19 symptom, he/she has to be sent to quarantine chamber immediately by medical personnel and medical assistance sought. Contractor to maintain extra room to keep person with symptom in quarantine. j. Workers may be advised to keep separate water bottles. Common water bottles/mugs/glasses to be preferably avoided. k. Contact Biometric attendance system is strictly prohibited till such advisory is in place. l. Regular disinfection of all Areas, Equipment and facilities i. Each agency to prepare the disinfecting plan and act accordingly. ii. A dedicated disinfectant gang to be identified for the task by each agency. The disinfectant gang to be provided full body suits for the task. iii. All areas (including office premises, site areas, chairs, tables, furniture etc.), tools & equipment to preferably be disinfected by dedicated gang every day before resumption of work. iv. Common touch points like handrails, lift buttons, door/window knobs or handles, vehicle door handles, taps, conference room & dining hall tables/chairs, common sofas/chairs, visitor sofa/chairs, files & folders, etc to preferably be disinfected regularly at frequent intervals every day. v. Pool vehicles, to be disinfected after every use. Social distancing to be maintained inside the common pool vehicles as per Govt./ statutory body guidelines. m. Provision of Disinfectant Spraying Machine and Disinfectant Chemical i. Provision of disinfectant machine may be deployed for faster disinfection of surfaces, premises, offices etc. The indicative composition of disinfectant chemicals is given in Corp HR Circular No. AA:HR:MR 1 (C) dated 20-03-2020 n. Disinfecting the operator/driver touch points of Vehicles/cranes, T&Ps etc. Disinfection to also be carried out for all Cranes, Vehicles, Equipment, consoles, T&Ps etc. which come into contact with operating personnel. o. Mandatory Disinfecting of all PPEs, Tools & Items on daily basis All PPEs, Tools & Items to be disinfected mandatorily before use/ issue and also those in stores	Agency/ BHEL

	p. Posters on COVID-19 q. Sufficient Posters on COVID-19 to be ensured across the site in languages understood by most workers. Contractor to display precautionary measures, 'Do's and Don'ts' at prominent places in languages spoken by their workers. **r. Provision of Hand-Hygiene at Site** 1) In order to ensure hand-hygiene at site, wash basins with sufficient flowing water (going to drain after washing – not re-usable) to be installed at various locations. Here flowing water means water flowing from any tap or poured from tanker/sump/tank etc. Dipping hands into water in buckets/tanks/sumps etc for the purpose of washing is strictly prohibited as it is counter-productive. **2) Brief guidelines for hand washing are as below:** i. Soap to be provided at each wash basin and replenished regularly. ii. Washing with soap for at least 20 seconds is recommended. iii. As a general guideline, for every 100 workers, 1 wash-basin may be provided at site areas. iv. Close queue to be avoided near wash-basins and 1-meter distance to be maintained. Round markers at 1-meter distance can be ensured as guidance **s. Penalty** i. To ensure compliance penalty may be imposed in line with district administration norms or higher for not wearing mask or violating social distancing guidelines. **ii.** Concerned subcontractor may also be warned of stricter penalties in case of continued negligence	
10	<u>Labor Colony</u> **Following guidelines for COVID Prevention in labor colony may be followed:** a. All relevant guidelines in Corporate HSE Circular BHEL:CO: SOP : COVID-19 : 01 to be followed **b.** HSEOCP No. 61A for Labor Colony. **c.** Any other guidelines issued by applicable Govt/ Statutory authorities	Agency/ BHEL
11	<u>Provision of Quarantine Chambers</u> a. In labor colony/ near site, a temporary home quarantine/ isolation chamber may be set up to keep possible infected cases (with cough, cold, fever or other symptoms) until further medical help arrives. Quarantine chamber should be away from labor colony tenements. **b.** Similar arrangement of quarantine chambers may be set up at Site premises. **c.** Necessary arrangements for quarantine shall be as per Govt./ statutory body guidelines	Agency/ BHEL
12	<u>Action in case any individual is suspected of COVID infection or showing symptoms</u> In case any suspected COVID-19 case is found or an individual is showing symptoms like cough/ cold/ fever etc.: a. Immediately alert BHEL HQ & Corporate office, Customer, Local authorities/ district administration, etc b. Arrange to take the individual to the COVID testing or COVID care facility as per advise of local authorities/district administration c. Sanitize and disinfect immediately all the areas where the person would have visited in the Project premises and labour colony etc.	Agency/ BHEL

	d. Co-operate with the local authorities in identifying and tracing individuals who might have come in close contact with the suspected person. Take immediate action as advised by the local authorities/ district administration, customer, etc including cordoning off or sealing of the area. e. Apprise BHEL offices and customer regularly.	
13	<u>Liaison with Specialty Hospitals for COVID-19</u> a. Liaison with specialty hospitals for COVID-19 test/treatment facility, for timely care to suspected individuals, and advice. b. Information regarding local authorities dealing with COVID to be maintained c. Addresses of COVID centers for possible scenarios to be maintained	BHEL
14	<u>Hazmat Suits and N95 Masks for Medical Personnel</u> Medical Personnel at site to be provided hazmat suits besides N95 masks	BHEL
15	<u>Training/ Awareness regarding COVID-19</u> All site personnel to be given inputs on COVID-19 regularly covering following broad topics: (Workers may be given Pep Talk once a month through Audio-Visual Medium and daily through toolbox talks and officials to be informed in internal meetings as and when they happen. Every meeting to begin with brief discussion on COVID-19 and need to ensure precautions like masks and social distancing). Suggested topics are given below: a. What is COVID-19 & How it spreads through coughing, sneezing and touching mucous membranes like mouth, eyes after touching infected surface b. What are the symptoms of COVID-19, namely coughing accompanied with fever and flu-like symptoms including running nose and sneezing c. The highly infectious spread, Number of infections and fatalities in the world from this disease d. Fatality rate from COVID-19 varies from 1-10% and individuals with preexisting conditions like heart diseases, diabetes, kidney & liver problems, smokers are more vulnerable to have serious effects from Coronavirus infection e. How COVID-19 infected individual can be asymptomatic, but can still infect friends and family members. Infected individual can be immune, but friends and family members can develop serious issues, so it is best to be protected to avoid problems for friends & family and especially elders f. According to studies, Coronavirus can stay on surfaces from few hours to few days, so touching of unknown surfaces to be avoided and hands washed/ sanitized frequently g. There is no cure/ vaccine for this disease so far h. Prevention is the only cure i. Best way to save oneself is to wear mask at all times and not to touch surfaces and protect oneself from infection from respiratory droplets	Agency/ BHEL
16	<u>Keeping Updated on COVID-19 in the Area/ Locality</u> Site to remain vigilant about any reported COVID-19 cases in the vicinity and take appropriate precautions/actions as advised by the local authorities/district administration	Agency/ BHEL

17	<u>Staggered Shifts to Avoid Contact during Commute</u> a. Staggered deployment of labour/staff to be ensured to prevent accumulation of people in work areas as well as in common transport vehicles. Aim is to ensure distance of minimum 1 meter between two occupants b. Drivers to also wear protective masks, preferably N95 c. Proper air circulation and ventilation to be ensured in vehicles	Agency/ BHEL
18	<u>Air circulation, filtering and ventilation in Office Premises & Training Halls</u> a. Air circulation to be ensured in closed areas b. Well ventilated areas/rooms preferred to air conditioning, to the extent possible	Agency/ BHEL
19	<u>Guidelines to handle outside papers (eg. At Weigh bridge area, LR copies, gate passes, documents, etc.)</u> 1. All involved personnel to strictly maintain 1-meter distance and all social distancing and other guidelines 2. PPES like Face mask and gloves to be necessarily worn by the dealing person. 3. If required, papers to be handled using long forceps, ironed on both sides using hot iron, and then handled (with gloves) 4. The driver/ visitor must always wear mask and maintain distance	Agency/ BHEL
20	<u>General/ Other</u> 1. Shift roster should be followed, 2. Mass gathering meetings should not be conducted. Communications/meetings to be preferably through telephone, Mail, WhatsApp, Web-ex, etc. Face to face meetings to be preferably avoided. In case of unavoidable situations, social distancing to be maintained. 3. Canteen to remain closed preferably. 4. Committee may be formed to monitor implementation of COVID-19 prevention steps besides hygiene and fulfillment of essential needs at labor colony. 5. Office common areas may be sanitized daily (door handle, pantry, washrooms, common printers and other common areas) 6. Vehicle seats and door handle to be sanitized daily. 7. Vehicle arrangement to be made so as to maintain social distancing. Extra persons should not travel in the vehicle. As per Corporate HSE circular, not more than 3 personnel to travel in a single site vehicle (6 seater) at a time 8. After lock down period, on resumption of work, all office equipment such as PC, Printers, AC, etc. are to be disinfected and started one be one after checking for any wear & tear due to rodent acts during lockdown. 9. Banning animals from site: As per recent reports, Coronavirus is also spreading to animals. Hence, all animals may preferably be expelled from site.	Agency/ BHEL

Note:

1. Other precautions as deemed necessary by concerned sites may be ensured in order to ensure strict precautions to prevent even a single case of Coronavirus Infection
2. Responsibilities are only indicative – to be decided at Site Level

Some Useful Links

A. Internet links of Govt and other authoritative sources on COVID-19 and Coronavirus are listed below:

1. MyGov COVID-19-19 Page: https://www.mygov.in/COVID-19/
2. Preventive Measures (Advisory) :https://www.mohfw.gov.in/pdf/PreventivemeasuresDOPT.pdf
3. Guidelines for Home Quarantine: https://www.mohfw.gov.in/pdf/Guidelinesforhomequarantine.pdf
4. Guidelines for COVID-19 Quarantine Facilities:https://ncdc.gov.in/WriteReadData/l892s/90542653311584546120.pdf
5. Posters, Dos, Don'ts on COVID-19:https://www.mohfw.gov.in/
6. Miscellaneous guidelines and circulars: https://www.nhp.gov.in/whatsnew
7. Advisory for Ensuring Safe Drinking Water : https://www.mohfw.gov.in/pdf/advisorydrinkingwaterpdf.pdf

B. World Health Organization:

1. Infection Prevention & Control :https://www.who.int/emergencies/diseases/novel-coronavirus-2019/technical-guidance/infection-prevention-and-control
2. Advice for Public : https://www.who.int/emergencies/diseases/novel-coronavirus-2019/advice-for-public
3. Points of Entry & Mass Gatherings: https://www.who.int/emergencies/diseases/novel-coronavirus-2019/technical-guidance/points-of-entry-and-mass-gatherings

Coronavirus Self Declaration Form

1) Name: ……..
2) Age: …….
3) Father's Name: ……..
4) Agency: ……
5) Identification Number……Identification Type……..
6) Arriving from: ……
7) Are you arriving from any COVID Hot Spots or Containment Zones? If Yes, please give details:

8) Have you come in contact in with relatives/ friends/ people infected, suspected or diagnosed with COVID-19 in last 21 days? If Yes, please provide your relationship with people and your last contact date with them:

9) Have you been advised quarantine/ isolation or undergone treatment w.r.t. COVID-19? If Yes, please provide details (date, duration, location, medical report etc.):

10) Please state if you have experienced/ are experiencing any of the following symptoms:

Symptom	Yes	No
i) Fever		
ii) Cough		
iii) Shortness of Breath		
iv) Persistent pain in the Chest		

I acknowledge that the information I have given is accurate and complete.

Date:
Place:
Signature:

Site to follow all the general safety precautions as per this OCP.

In addition, relevant records pertaining to actions taken to be prepared and kept.

Records:

Record Title	Record No.	Location	Responsibility	Retention Period

Verification, Corrective and Preventive Action:

HOD / Site In-charge shall ensure effective implementation of the above procedure. In case of any deviation, shall take suitable corrective and preventive action.

Revision History

Revision Date	Revision No.	Old Text	New Text	Reason	Revised by
18/04/2020	00	-	-	First Issue	As indicated on Page 1
01/06/2020	01	-	Besides general improvements/ corrections, modifications as below: **Added (Other clauses shifted by 2):** 1. Deployment of COVID Marshalls 2. Directions for newly Joining Workers/ Officials; Addition of Format F1 **Edited:** 4. Construction material, unless sanitized to be kept undisturbed for 3 days 6. Sanitization staff to be given coveralls 10. Reference to OCP 61A for COVID Prevention in labor colony added	New Govt. guidelines/ general improvements	PSHQ-HSE

BHEL	**OPERATIONAL CONTROL PROCEDURE**	**Doc. No.: HSEOCP: 61A** **Rev. No.: 00** **Rev. Date: 27.04.2020** **Page 1 of 3**
OCP No. : 61A	Prevention of COVID-19 Infection in Labor Colony	

Purpose	➢ To ensure necessary precautions in Labor Colony in order to prevent spread of Infectious diseases like COVID-19 among residents	Scope	PS Regions
Applicability	➢ This SOP applies to labor colonies at project sites.		
Responsibility	Concerned Site In-charge / Site HSE Head/Package Head		
Performance Criteria	Number of cases of violations from these guidelines. Violations must be recorded and compliances be done for the same immediately/ within a day		
References	➢ HSEOCP:61 and all References therein This OCP is an Annexure to HSEOCP 61)		

Procedures and Controls		
S No	Activity	Responsibility
1	<u>General</u> a. Norms for social distancing, training/ awareness, face masks, disinfection, sanitization, gate entry, quarantine, medical, action in case of suspect COVID cases etc. as indicated in HSEOCP:61, Corporate HSE Circular BHEL:CO: SOP: COVID-19 : 01 and Govt. guidelines b. Each labor colony will be secured preferably by a boundary wall and gate, manned by a guard. Only workers with valid ID cards to be let inside c. New workers should not be allowed to enter colony without health checkup.	Agency, BHEL
2	<u>Precautions for Living Rooms & Common Areas in Labor Colony</u> a. **Spacing of minimum 2 meters between living areas of workers inside a room may be maintained.** Preferably, the living area of each worker may be partitioned using sheet of cloth, plastic etc. b. Rooms to be properly ventilated as far as possible c. Sanitation to be given prime importance and personal hygiene to be promoted d. Outside every common facility, eg. Toilet, washroom, food hall/ canteen etc., provision of washbasin with water (flowing water preferably) and soap (preferably liquid soap) to be ensured e. Round markers with chalk at 1-2 meter distance to prevent crowding at each common facility like toilet, washroom, drinking water point, washing area, mess/ canteen etc. f. **Staggered shift planning** – In case the capacity of infrastructure and facilities like toilets, washrooms, canteen etc. is not sufficient, workers can be assigned staggered shifts so as to not overwhelm the facilities. A group can depart before the next group starts to get ready. Detailed assessment and planning in this regard is to be carried out by each concerned agency g. Face masks shall be worn by everyone inside the colony premises (Refer 1(a)). h. Sanitisation/Disinfection of all areas to be carried out regularly (Refer 1(a)). i. Spitting of Pan. Gutkha etc. inside the colony and urinating etc. outside the toilets to be strictly avoided j. Regular visits by Doctors to the labor colony can be arranged on non-working day for check-up of all workers k. Banning animals from labor colony: As per recent reports, Coronavirus is also spreading among animals. Hence, all animals to preferably be expelled from labour colony. l. Necessary social distancing to be ensured during cooking and taking food. Separate water bottles, utensils etc to be preferably maintained by each worker to prevent infection. Common cooking to be preferably avoided. In case necessary, adequate care to be taken especially w.r.t. health and well-being of the cook and maintaining proper distance during serving food/ tea etc.	Agency/ BHEL

	m. Identification of **"COVID Wardens"** (CWs) by each agency for maintaining the following: i. Keeping an eye on the health of workers and report any suspected cases of fever, coughing etc. to the management ii. Keeping an eye on the social distancing measures in the labor colony and report any non-conformances to the management. iii. Educate the workers about social distancing and COVID prevention measures. n. **Training/ Awareness regarding COVID-19** i. Workers to be instructed to maintain social distancing of minimum 1 m at all time ii. **Posters on COVID-19:** Sufficient Posters on COVID-19 to be ensured across the labor colony in languages understood by most workers. iii. All workers to be instructed to inform any suspected cases of illness (individual or others) to an emergency contact number of CW, The emergency contact numbers and CW contact numbers to be displayed at prominent locations o. **Commute to/ from Labor Colony** i. Social distancing precautions and masks to be strictly ensured during commute between labor colony and site. Govt. guidelines on occupancy of the vehicles to be followed. ii. In case vehicles are used, concerned drivers to be instructed to keep a watch on the occupants following the necessary social distancing measures and wearing masks. p. **Inspection & Review** i. Daily Inspection by concerned COVID Wardens and reporting to Agency ii. Regular inspection by Agency & BHEL	

Note:

1. Other precautions as deemed necessary by concerned sites may be ensured in order to prevent Coronavirus Infections. This OCP suggests minimum requirements. However, Sites may consider alternative actions based on feasibility and circumstances, while adhering to GOI/District Administration/Local Authority guidelines, issued from time to time for social distancing, sanitation, use of face masks, etc
2. Responsibility assignments are only indicative – to be decided at Site Level

Site to follow all the general safety precautions as per this OCP.

In addition, relevant records pertaining to actions taken to be prepared and kept.

Records:

Record Title	Record No.	Location	Responsibility	Retention Period

Verification, Corrective and Preventive Action:

HOD / Site In-charge shall ensure effective implementation of the above procedure. In case of any deviation, shall take suitable corrective and preventive action.

Revision History

Revision Date	Revision No.	Old Text	New Text	Reason	Revised by
27/04/2020	00	-	-	First Issue	PSHQ-HSE

PROFORMA OF BANK GUARANTEE (in lieu of SECURITY DEPOSIT)

In consideration of the 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 BHEL House, Siri Fort, Asiad, New Delhi – 110049 through its Unit at Bharat Heavy Electricals Limited, Power Sector Eastern Region, BHEL Bhawan, Plot No 9/1, DJ Block, Sector-II, Salt lake City, Kolkata – 700091 having agreed to exempt (Name of the Vendor / Contractor / Supplier) having its registered office at_____ [1] (hereinafter called the said Contractor which term includes supplier), from demand under the terms and conditions of the Contract reference No._____ [2] dated _____[2] valued at Rs…….[2] (Rupees ----------)[2] for <Nature of the Work>[3] (hereinafter called the said Contract) of Security Deposit for the due fulfilment by the said contractor of the terms and conditions contained in the said Contract, on production of a Bank Guarantee for Rs._____ [4] (Rupees _____ only), we ____(indicate the name and address of the Bank) having its Head Office at _____(address of the head Office) (hereinafter referred to as the Bank) at the request of _____ [Name of Contractor(s)] do hereby undertake to pay to the Employer an amount not exceeding Rs._____ in the event of any breach by the said Contractor(s) of any of the terms and conditions contained in the said Contract.

We, _____(indicate the name of the Bank), do hereby undertake to pay the amounts due and payable under this guarantee without any demur, merely on a demand from the Employer. 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 Contractor(s) in any suit or proceeding pending before any Court or Tribunal relating thereto 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 Contractor(s) shall have no claim against us for making such payment.

We, 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 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 claim satisfied or discharged or till _____ [5] or till the office/Department/Division of Bharat Heavy Electricals Limited certifies that the terms and conditions of the said Contract have been fully and properly carried out by the said contractor(s) and also including the satisfactory performance of the equipment during guarantee period and accordingly discharges this guarantee. Unless a demand or claim under this guarantee is made on us in writing on or before the _____[6], (3 months more than the present date of validity of Bank Guarantee) we shall be discharged from all the liability under this guarantee thereafter.

We, ____(indicate the name of the 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 contractor(s) 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 contractor(s) 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 any reason of any such variation or extension being granted to the said contractor(s) or for any forbearance, act or omission on the part of the Employer or any indulgence by the Employer to the said contractor(s) 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.

This guarantee will not be discharged due to the change in the constitution of the Bank or the Contractor(s).

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…… [7]

b) This Guarantee shall be valid up to ……[8]

c) Unless the Bank is served a written claim or demand on or before _____[9] (3 months more than the present date of validity of Bank Guarantee) 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, ____(indicate the name of the Bank)____ lastly undertake not to revoke this guarantee during its currency except with the previous consent of the Employer in writing.

Any claim or dispute arising under the terms of this document shall only be enforced or settled in the courts of at Kolkata only.

Date _____ Day of _____

for____(indicate the name of the Bank)__

(Signature of Authorised signatory)

[1] *NAME AND ADDRESS OF THE VENDOR /CONTRACTOR / SUPPLIER .*

[2] *DETAILS ABOUT THE NOTICE OF AWARD/CONTRACT REFERENCE*

[3] *PROJECT/SUPPLY DETAILS*

[4] *BG AMOUNT IN FIGURES AND WORDS*

[5] *VALIDITY DATE*

[6] *DATE OF EXPIRY OF CLAIM PERIOD*

[7] *BG AMOUNT IN FIGURES AND WORDS.*

[8] *VALIDITY DATE*

[9] *DATE OF EXPIRY OF CLAIM PERIOD*

Note:

1. **Units are advised that expiry of claim period may be kept 2/3 months after validity date.**
2. **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 (BHEL's Consortium Bank). 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). In case, of Foreign Vendors, the BG Format provided to them should clearly specify the same.

b.4 The BG should clearly specify that the demand or other document can be presented in electronic form.

BANK GUARANTEE FOR PERFORMANCE SECURITY

Bank Guarantee No:

Date:

To

NAME

& ADDRESSES OF THE BENEFICIARY

Dear Sirs,

In consideration of the 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 BHEL House, Siri Fort, Asiad, New Delhi – 110049 through its Unit at Bharat Heavy Electricals Limited, Power Sector Eastern Region, BHEL Bhawan, Plot No 9/1, DJ Block, Sector-II, Salt lake City, Kolkata – 700091 having awarded to (Name of the Vendor / Contractor / Supplier) having its registered office at_____[1] hereinafter referred to as the 'Contractor/Supplier', which expression shall unless repugnant to the context or meaning thereof, include its successors and permitted assigns), a contract Ref No……dated ……[2] valued at Rs……[2] (Rupees ----------)for <Nature of Work>[3] (hereinafter called the 'Contract') and the Contractor having agreed to provide a Contract Performance 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 a maximum amount Rs ---------- (Rupees ----------)[4] without any demur, immediately on a demand from the Employer, .

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 Contractor/ Supplier in any suit or proceeding pending before any Court or Tribunal relating thereto 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 contractors/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 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 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 Contractor/Supplier and to forbear or enforce any of the terms and conditions relating to the said Agreement and we shall not be relieved from our liability by reason of any such variation, or extension being granted to the said Contractor/Supplier or for any forbearance, act or omission on the part of the Employer or any indulgence by the Employer to the said 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 Contractor and notwithstanding any security or other guarantee that the Employer may have in relation to the Contractor's liabilities.

This Guarantee shall remain in force upto and including…….. [5] 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 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 ……[6] (3 months more than the present date of validity of Bank Guarantee) we shall be discharged from all liabilities under this guarantee thereafter.

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…… [7]
b) This Guarantee shall be valid up to ……[8]
c) Unless the Bank is served a written claim or demand on or before _____[9] (3 months more than the present date of validity of Bank Guarantee) 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.

Any claim or dispute arising under the terms of this document shall only be enforced or settled in the courts of at Kolkata only.

For and on behalf of

(Name of the Bank)

Dated……..

Place of Issue……

[1] NAME AND ADDRESS OF THE VENDOR /CONTRACTOR / SUPPLIER.

[2] DETAILS ABOUT THE NOTICE OF AWARD/CONTRACT REFERENCE

[3] PROJECT/SUPPLY DETAILS

[4] BG AMOUNT IN FIGURES AND WORDS

[5] VALIDITY DATE

[6] DATE OF EXPIRY OF CLAIM PERIOD

[7] BG AMOUNT IN FIGURES AND WORDS.

[8] VALIDITY DATE

[9] DATE OF EXPIRY OF CLAIM PERIOD

Note:

1. **Units are advised that expiry of claim period may be kept 2/3 months after validity date.**

2. **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 (BHEL's Consortium Bank). 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). In case, of Foreign Vendors, the BG Format provided to them should clearly specify the same.

b.4 The BG should clearly specify that the demand or other document can be presented in electronic form.

List of Consortium Banks *			
	Nationalised Banks		**Nationalised Banks**
1	Allahabad bank	19	Vijaya Bank
2	Andhra bank		**Public Sector Banks**
3	Bank of Baroda	20	IDBI
4	Canara Bank		**Foreign banks**
5	Corporation bank	21	CITI Bank N.A
6	Central bank	22	Deutsche Bank AG
7	Indian Bank	23	The Hongkong and Shanghai Banking Corporation Limited
8	Indian Oversea Bank	24	Standard Chartered Bank
9	Oriental bank of Commerce	25	J P Morgan
10	Punjab National Bank		
11	Punjab & Sindh Bank		**Private banks**
12	State Bank of India	26	Axis Bank
13	State Bank of Hyderabad	27	The Federal Bank Limited
14	Syndicate Bank	28	HDFC
15	State Bank of Travancore	29	Kotak Mahindra Bank
16	UCO Bank	30	ICICI
17	Union Bank of India	31	Indusind Bank
18	United Bank of India	32	Yes Bank

* wef 22.03.2016

RTGS FORMAT

Form for getting payment through RTGS (Real Time Gross Settlement)

01. NAME OF VENDOR

02. ADDRESS

03. VENDOR'S BANK A/C NAME

04. VENDOR'S BANK A/C NO.

05. NAME OF BANK

06. NAME OF BRANCH

07. BRANCH PH. NO.

08. CITY

09. IFSC CODE OF THE BRANCH

THE CHARGES IF ANY FOR PAYMENT THROUGH RTGS MAY BE RECOVERED FROM THE BILL SUBMITTED BY US.

SIGNATURE OF AUTHORISED REPRESENTATIVE OF VENDOR WITH DATE & SEAL

CONFIRMATION BY BANKER WITH OFFICE SEAL

Note : Incorrect information will crate accounting complications and payment will be delayed.

RTGS DETAILS OF BHEL-PSER FOR EFT BY BIDDER/CONTRACTOR

Form for getting payment through RTGS (Real Time Gross Settlement)

01.	*Name of Vendor*	BHARAT HEAVY ELECTRICALS LTD.
02.	*Address*	~~BHEL~~ BHEL HOUSE, SIRI FORT, N.DELHI
03.	*Vendors Bank A/c Name*	BHARAT HEAVY ELECTRICALS LTD.
04.	*Vendors Bank A/c No.*	11107800029
05.	*Name of Bank*	STATE BANK OF INDIA
06.	*Name of Branch*	COMMERCIAL BR., SALT LAKE, SECTOR-V KOLKATA
07.	*Branch Phone No.*	033-23575666
08.	*City*	KOLKATA
09.	*IFSC Code of the Branch*	SBIN 0004289

The charges if any for payment through RTGS may be recovered from the Bill submitted by us.

Signature of Authorised Representative of Vendor with office seal

के. के. कोआरी / K. K. Coari
उप महाप्रबंधक (वित्त) / Dy. General Manager (Fin)
बी. एच. ई. एल. : पी.एस.ई.आर : कोलकाता - 700 091
BHEL : PSER / Kolkata-700 091

Confirmation by Banker with office seal

State Bank of India ★ (SALT LAKE) 4289 ★ Commercial Branch

Note : Incorrect information will create Accounting complications and payment will be delayed

GENERAL & SPECIAL CONDITIONS OF CONTRACT [FOR SERVICES JOB]

PSER KOLKATA

SECTION – I
Instructions to Tenderers
GENERAL INSTRUCTION TO TENDERERS

1.1 Submission of Tender in "Three Parts".

(1) Technical Tender: All particulars asked for from the Vendor except the Price Bid & E.M.D in an envelope.

(2) EMD in a sealed envelope clearly superscribing on the envelope "E.M.D", the Tender Number, Name of Work, addresses of Vendor and addressee. One time EMD holders needn't enclose this provided that proof of EMD remittance is enclosed in the technical tender.

(3) Price Bid in the price schedule enclosed in the tender, in sealed envelope, clearly superscribing "Price Bid", Tender Number, Name of Work, Name of the Vendor and addressee.

All the above "Parts" can be placed in an sufficiently large outer envelope for submission.

1.1.1a This Tender specification as a whole, duly furnishing the following details shall be duly signed and sent in a sealed cover superscribing :

TENDER FOR
TENDER SPECIFICATION NO.
DUE ON _____

1.1.1b DURATION OF JOB

1.1.1.1 Earnest Money Deposit.

1.1.1.2 Income Tax & Sales Tax Clearance Certificate.

1.1.1.3 Detailed organisation chart for manpower resources available with the tenderer and to be employed for the present jobs.

1.1.1.4 Time to be taken for commencement and completion of Work.

1.1.1.5 A list of experience as mentioned in the tender document.

1.1.1.6 The details of the present jobs being handled.

1.1.1.7 Certificate from the BHEL's scheduled Banks to establish financial capability of the tenderer as per format enclosed at Annexure-I.

1.1.1.8 Attested copies of partnership deed, power of attorney and tender specifications duly signed as mentioned in the tender documents.

1.1.1.9 Price schedule and other relevant information.

NOTE: All Xerox copies enclosed by the Vendor should be attested and sealed for authenticity.

1.1.2 The tender shall be addressed to:

HEAD, PURCHASE DEPARTMENT
BHARAT HEAVY ELECTRICALS LIMITED,
POWER SECTOR, EASTERN REGION, (2ND FLOOR),
PLOT-9/1, BLOCK-DJ, SECTOR-II, SALT LAKE,
KOLKATA – 700091.

1.1.3 Tenders submitted by post shall be sent "REGISTERED POST ACKNOWLEDGEMENT DUE" and shall be posted with the due allowance for any postal delay. The tenders received after the due date and time of opening are liable to be rejected. Telegraphic offers and offers received by telex may not be considered unless confirmed in writing by a detailed offer.

1.1.4 Tenders shall be opened by the authorised officer of BHEL at his office at the time and date as specified in the tender notice in the presence of such of those tenderers or their authorised representatives who may be present.

1.1.5 The Tenderer shall closely peruse all the clauses, specifications and drawings indicated in the Tender Documents before quoting. Should the tenderer have any doubt about the meaning of any portion of the Tender Specifications or find discrepancies or omission in the drawings or the tender documents issued are incomplete or shall require clarification on any of the technical aspect, scope of work etc., he shall at once contact the authority inviting the tender for clarification before the submission of the offer.

1.1.6 Before tendering, the tenderer is advised to inspect the site of work and the environments and be well acquainted with the actual working and other prevalent conditions, facilities available, position of material and labour. No claim will be entertained later on the ground of lack of knowledge.

1.1.7 Tenderers must fill up all the schedules and furnish all the required information as per the instructions given in various sections of the tender specification. Each and every page of the Tender Specification & deceleration must be signed bearing seal and submitted along with the offers by the Tender in token of complete acceptance thereof. The information furnished shall be complete by itself. The booklet of G.S.C.C may be retained by the bidder if deceleration is enclosed along with the bid duly filled in and signed and sealed.

1.1.8 The tender shall quote the rates in English language and internationals numerals. The rates shall be in whole rupees. These rates shall be entered in figures as well as in words. For the purpose of the tender, the metric system of units shall be used.

1.1.9 All entries in the tender shall either be typed or be in ink. Erasures and overwriting are not permitted and may render such tenders liable to summary rejection. All cancellations and insertions shall be duly attested by the tenderer.

1.2 Qualifications of Tenderers:

Only tenderers who have previous experience in work of this nature and description detailed in this tender specification and/or registered with BHEL, PS-ER-SAS for such works are expected to quote for this work duly detailing their experience along with the offer. Offers from tenderers who do not have established experience in the field are not likely to be considered.

1.3 Data to be enclosed:

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

1.3.1 Financial Status:

a) A certificate from BHEL's scheduled Bank to prove his financial capacity/capability to undertakes the work of solvency certificate from the concerned Government Authority.

b) Contractors other than those who are registered in ER, should submit their audited annual accounts for three years preceding the financial year in which tenders are called for.

1.3.2 Income Tax / Sales Tax Certificate :

A certificate of Income Tax / Sales Tax verification from the appropriate authority in the forms prescribed therefor duly indicating annual turnover. The certificates shall be valid for one year from the date of issue or for the period prescribed therein for all tenders submitted during the period.

1.3.3 Previous Experience:

A statement giving particulars duly supported by documentary evidence of the various services rendered for each similar work by the tenderer indicating the particulars and value of each work, the site location and the duration and date of completion and also a list of site locations and particulars and value of various services that are under progress.

1.3.4 Organisation Chart:

The organisation pattern that is totally available with the tenderer and that will be employed by the tenderer for this work duly indicating the number of Engineers and Supervisors, their qualification and experience in the line, the number of skilled and unskilled workmen etc.

1.3.5 An attested copy of the Power of Attorney, in case the tender is signed by an individual other than the sole proprietor, shall also be attached.

1.3.6 In case of an individual:
His full name, address and place and nature of business.

1.3.7 In case of Partnership firms:
The name of all the partners and their addresses. A copy of the Partnership Deed (Instrument of partnership) duly certified by the Notary Public shall be enclosed.

1.3.8 In case of Companies:
Date and place of registration including Date of Commencement Certificate in case of public companies (certified copies of Memorandum and Articles of Associations are also to be furnished).

1.3.9 Nature of business carried on by the Company and the provision of the Memorandum relating thereof.

1.3.10 Names and particulars including addresses of all the Directors and their previous experience.

1.3.11 A list of tools and tackles that the tenderer is having and those that will be earmarked for this job.

1.3.12 In addition to the above, the particulars required in various annexures.

1.4 **EARNEST MONEY DEPOSIT (EMD):**

1.4.1 Every tender Must be accompanied by the prescribed amount of Earnest Money Deposit in any one of the following forms:

1.4.1.1 **Cash deposit as permissible under the extant Income Tax Act** (Before tender opening) - The amount should be remitted by the party to the Cashier of Bharat Heavy Electricals Limited, PS-ER, Kolkata between 14.00 hours and 16.00 hours on working days and cash receipt issued by him shall be enclosed along with the tender.

1.4.1.2 **Electronic Fund Transfer** credited in Bharat Heavy Electricals Limited, PS-ER' account (before tender opening). RTGS details of BHEL-PSER is available in tender.

1.4.1.3 **Banker's Cheque/Pay Order/Demand Draft** payable at Kolkata duly pledged in Favour of Bharat Heavy Electricals Limited, Kolkata (along with offer).

1.4.1.4 **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).

1.4.1.5 **Any other mode as per latest guidelines issued by Govt. of India.**

In addition to above, the EMD amount in excess of Rs. 2 Lakh may also be accepted in the form of Bank Guarantee from scheduled bank. The Bank Guarantee in such cases shall be valid for atleast six months.

1.4.1.6 Parties/bidders who have submitted/submits **One Time EMD (OEMD) in this Power Sector Region (i.e. BHEL-PSER) for Service After Sales (SAS) a sum of amount Rs. 5,00,000/- (Rupees Five Lakh only)** are exempted from payment of E.M.D. on each such tender in that unit on case to case basis.

1.4.2 Tenders received without Earnest Money in full in the manner prescribed above are liable to be rejected. EMD shall not carry any interest.

1.4.3 The Earnest Money Deposit of the successful tenderer will be retained as part of Security Deposit.

1.4.4 EMD given by all unsuccessful tenderers shall be refunded normally within 15 days of award of work.

1.4.5 BHEL reserves the right of forfeiture of Earnest Money Deposit submitted by the tenderer if:-

a) 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.

b) The Contractor fails to deposit the required Security Deposit or commence the work within the period as per LOI/Contract.

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" and forfeited/released based on the action as determined under these guidelines".

1.5 Authorisation and Attestation:

1.5.1 Tenders shall be signed by persons duly authorised/empowered to do so. Certified copies of such authority and relevant documents shall be submitted along with the tenders.

1.6 Validity of Offer:

The rates in the tender shall be kept open for acceptance for a minimum period of six months from the due date of opening of tenders. If a tenderer withdraws or revokes his tender or increases the tender rates and/or conditions for any item within the aforesaid period, his Earnest Money Deposit is liable to be forfeited. In case the Bharat Heavy Electricals Limited calls for negotiations, such negotiation shall not amount to cancellation or withdrawal of the original offer which shall be binding on the tenderers.

1.7 Execution of Contract:

The successful tender's responsibility under this contract commences from the date of issue of the Letter of Intent by Bharat Heavy Electricals Limited. The successful tenderer may be required to execute an agreement in the prescribed form with the BHEL within a reasonable time after the acceptance of his tender and in any case before submitting first RA bill for payment. The expenses for completing and stamping the agreement shall be borne by the tenderer.

1.8 **Security Deposit (SD):**

1.8.1 Security Deposit means the security provided by the contractor towards fulfilment of any obligations in terms of the provisions of the contract. Upon acceptance of tender, the successful tenderer within the time specified in the Letter of Intent must deposit the required amount towards Security Deposit before start of the work. The Security Deposit shall not carry any interest.

1.8.2 The total amount of **Security Deposit will be 5% (Five percent) of the contract value.** EMD of the successful tenderer shall be converted and adjusted towards the required amount of Security Deposit.

1.8.3 If the value of the work done at any time exceeds the accepted agreement value, the Security Deposit shall be correspondingly enhanced and the additional Security Deposit shall immediately be deposited by the contractor or recovered from payments due to the contractor.

1.8.4 Regarding adjustment of Earnest Money Deposit towards part of Security Deposit, refer clause 1.8.2 above, the successful tenderer shall not commence any work under the contract before remitting the Security Deposit except as directed by BHEL.

1.8.5 Failure to deposit the Security within the stipulated time may lead to forfeiture of Earnest Money and cancellation of the award of work.

1.8.6 The balance amount to make up the required Security Deposit of 5% of the contract value may be furnished in any one of the following forms:

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

ii) Local cheques of scheduled banks (subject to realization)/Pay Order/Demand Draft/Electronic Fund Transfer credited in Bharat Heavy Electricals Limited, PS-ER' account.

iii) Bank Guarantee from Scheduled Banks / Public Financial Institutions as defined in the Companies Act. The Bank Guarantee format should have the approval of BHEL. Bank Guarantee for S.D. must be posted by the Bank by registered post directly to us, and it should not be submitted by the bidder directly to us.

iv) Fixed Deposit Receipt 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).

v) 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).

vi) Any other mode as per latest guidelines issued by Govt. of India.

Note: 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.

1.8.7 **Collection of Security Deposit:**

1.8.7.1 At least 50% of the required Security Deposit, including EMD, should be collected before start of work. Balance of the Security Deposit can be collected by deducting 10% of the gross amount progressively from each of the running bills of the contractor till the amount of the required Security Deposit is collected.

1.8.7.2 If the value of the work done at any time exceeds the accepted agreement value, the Security Deposit shall be correspondingly enhanced and the additional Security Deposit shall immediately be deposited by the contractor or recovered from payments due to the contractor.

1.8.7.3 The recoveries made from running bills (cash deduction towards balance SD amount) can be released against submission of equivalent Bank Guarantee in acceptable form, but only once, before completion of work, subject to approval of BHEL.

1.8.7.4 Security Deposit should cover up to the period of guarantee also.

(Note: In case of SAS jobs, work can be started before the required Security Deposit is collected. However, payment can be released only after collection/ recovery of initial 50% Security Deposit).

1.8.8 BHEL reserves the right of forfeiture of Security Deposit in addition to other claim and penalties in the event of the contractor's failure to fulfil any of the contractual obligations including statutory or in the event of termination of contract as per terms and conditions of contract.

1.8.9 Return of Security Deposit:

If the contractor duly performs and completes the contract in all respects to the entire satisfaction of BHEL, and presents an absolute "No Demand Certificate" in the prescribed form and return properties belonging to BHEL handed over, lent or hired by him for carrying out the said works the security deposit will be released to the contractor after deducting all costs or expenses or other contracts entered into with the contractor, only after the satisfactory completion or guarantee period as per clause 2.13.

1.8.10 No interest shall be payable by BHEL on Earnest Money / Security Deposit or any money due to the contractor from BHEL.

1.8.11 In no case Security Deposit can be released before settling all claims under this contract.

1.9 Rejection of Tender and other conditions:

1.9.1 The acceptance of tender will rest with BHEL which does not bind itself to accept the lowest tender or 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.
c) To award the work in part.
d) Either of the contingencies stated in (b) and (c) to modify the time for completion suitably.
e) To modify the scope of work after mutual agreement.

1.9.2 Conditional and unwitnessed tenders:

Tenders containing absurd or unworkable rates and amounts and tenders which are incomplete and otherwise considered defective and tenders not in accordance with the tender conditions, specifications etc. are liable to be rejected.

1.9.3 If a tenderer expires after his submission of the 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 the tender or after the acceptance of the tender, BHEL may cancel such tender at their discretion unless the firm retains its character.

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

1.9.5 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.

1.9.6 Canvassing in any form in connection with the tenders is strictly prohibited and the tenders submitted by the contractor who resort to canvassing are liable to rejection.

1.9.7 Should a tenderer or contractor or in the case of a firm or Company of Contractors one or more of its Partners/shareholders/Directors have a relation or relations employed in the capacity of an officer of BHEL, the authority inviting tender shall be informed of the fact along with the offer, failing this, BHEL may at its sole discretion, reject the tender or cancel the contract and forfeit the Earnest Money/Security Deposit.

1.9.8 The successful tenderer should not sub-contract the part or complete work detailed in this tender specification undertaken by him without permission of BHEL. The tenderer is solely responsible to BHEL for the work awarded to him. Any deviation in this regard will entail termination of such contract by BHEL at the risk and responsibility of contractor.

1.9.9 The successful tenderer shall inform/keep BHEL informed if he has already undertaken any work/is likely to be awarded any job with the same customer with whom BHEL is entering into contract.

SECTION – II

GENERAL TERMS & CONDITIONS OF THE CONTRACT

2.1 Definition:

The following terms and expressions shall have the meaning hereby assigned to them except where they context otherwise requires:

2.1.1 'BHEL' (or B.H.E. Ltd.) shall mean Bharat Heavy Electricals Limited, a company registered under Indian Companies Act., 1956, with its Registered Office at BHEL House, SIRI FORT, NEW DELHI-110049, Power Sector, Eastern Region, Service After Sales – Services, DJ-9/1,Salt Lake, Kolkata – 700091 or its Administrative officers or its site Engineer or the employees authorised to deal with any matters with which these persons are concerned on its behalf.

2.1.2 "GENERAL MANAGER"/DEPUTY IN CHARGE" shall mean the Officer in Administrative charge of BHEL, PS-ER, SAS – Services, Kolkata or their other regional offices.

2.1.3 "ENGINEER" or "ENGINEER IN CHARGE" shall mean Engineer deputed by BHEL. The terms include "SITE ENGINEER", "RESIDENT ENGINEER" and "ASSISTANT SITE ENGINEER" of BHEL at the site as well s the officers in-charge at Kolkata office.

2.1.4 "SITE" shall mean the place or places at which the plants/equipment are to be overhauled and services are to be performed as per the specification of this contract.

2.1.5 "CLIENTS OF BHEL" or "CUSTOMER" shall mean the Project authorities to whom BHEL is supplying the equipment/services.

2.1.6 "CONTRACTOR" shall mean the individual, firm or company who enters into this contract with BHEL and shall include their executors, administrators, successors and permitted assigns.

2.1.7 "CONTRACT" or "CONTRACT DOCUMENT" shall mean and include the agreement or work order, the accepted appendices of rates, schedule of quantities, if any and general condition of contract, the special conditioning of contract instructions of the tenderers, the drawings, the specifications, the special specification, if any, the tender specifications, the special specification, if any, the tender documents and the Letter of Intent/Accepting Letter issued by BHEL. Any conditions or terms stipulated by the contractor in the tender documents or supporting letters shall not form part of the contract unless specifically accepted in writing by BHEL and incorporated in the agreement.

2.1.8 "GENERAL CONDITIONS OF CONTRACT" shall mean the instructions to tenderers and general conditions of contract pertaining to the work detailed.

2.1.9 "TENDER SPECIFICATION" shall mean the "Specific Conditions, technical specifications, appendices, site information and drawings, "pertaining to the work for which the tenderers are required to submit their offer. Also this will include the specifications detailed in NIT of client of BHEL for overhauling, erection, testing and commissioning of plant. Individual specification no. will be assigned to each tender specification.

2.1.10 "TENDER DOCUMENTS" shall mean the General conditions of contract (2.1.8) and tender specification (2.1.9)

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

2.1.12 "COMPLETION TIME" shall mean the period by date specified in the acceptance of tender for handing over the overhauled equipment/plant which are found acceptable by the engineer being of required standard and conforming to the specification of the contract or recommissioning of the machine successfully whichever is later. Completion time will be reckoned from the date of LOI with the period for mobilisation as prided with LOI, added to the same.

2.1.13 "PLANT" shall mean and cannot the entire assembly of the plant and equipments covered by the contract.

2.1.14 "EQUIPMENT" shall mean all equipments, machineries, materials, structurals, electricals and other components of the plant covered by the contract.

2.1.15 "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 contract work or part thereof.

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

2.1.17 "WORK OR CONTRACT WORK" shall mean and include supply of all categories of labour, specified consumables, tools and tackles required for complete and satisfactory site transportation, handling, stacking, storing, overhauling erection, testing and commissioning of the equipment to the entire satisfaction of BHEL.

2.1.18 "SINGULAR AND PLURAL ETC" words carrying singular number shall also include plural and vice versa, where the context so requires, words importing the masculine gender shall be taken to include any company or Association or body of individuals, whether incorporated or not.

2.1.19 "HEADINGS" The Leadings in these general conditions are solely for the purpose of facilitating reference and shall not be deemed to be part thereof or be taken into consideration in interpretation or construction thereof or of the contract.

2.1.20 'MONTH" shall mean calendar month.

2.1.21 "WRITING" shall include any manuscript, type written or printed statement under the signature or seal as the case may be.

2.2 Law governing the contract and Court Jurisdiction:

The contract shall be governing by the Law for the time being in force in the Republic of India. The Civil Court having ordinary original civil jurisdiction, Kolkata shall alone have exclusive Jurisdiction in regard to all claims in respective of this contract.

2.3 Issue of Notice:

The contractor shall furnish to the BHEL Engineer the name, designation and address of his authorised agent and all complaints, notices, communications and reference shall be deemed to have been duly given to the contractor if delivered to the contractor or his authorised agent or left at or posted to the address either of the contractor or of his representative and shall be deemed to have been so given in the case of posting on the day on which they would have reached such address in the ordinary course of past or on which they were so delivered or/or left.

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 the written permission of BHEL.

2.5 Commencement of Work:

2.5.1 The contractor shall commence the work within the time indicated in the Letter of Intent from BHEL and shall proceed with the same with due expedition without delay. For computing the scheduled completion date, commencement, of work will be reckoned from the date of complete mobilisation as per LOI, unless specifically amended by Head (Services), BHEL, Kolkata.

2.5.2 If the successful tenderer fails to start the work within the stipulated time, BHEL as its discretion will have the right to cancel the contract. His Earnest Money and / or Security Deposit with BHEL will stand forfeited without any further reference to him, without prejudice to any and all of BHEL's other rights and remedies in this regard.

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

2.5.4 The erected overhauled plant or work performed under the contract shall be taken over when it has been completed in all respects and or satisfactorily put into operation at site.

2.6 Mode of payment and measurement of the work completed.

2.6.1 "All payment due to the contractor shall be paid only by Account payee Cheques"

2.6.2 The contractor shall present his bill on the format prescribed by BHEL for every payment. After verification of such bills by BHEL, all items having financial value shall be entered and certified in BHEL Measurement Book by BHEL Engineer and the bills prepared based on the same and connected technical documents which form part of this tender specification.

2.6.3 Lump sum omission will be entered for deduction. Measurement shall be restricted to that for which it is required to ascertain the financial liability of BHEL under this Contract.

2.6.4 Work which is to be measured in details shall be measured as per standard procedure without reference to any local procedures without reference to any local procedures excepting where it is otherwise stated in the tender documents. The measurement shall be taken jointly by person duly authorised on the part of BHEL and by the contractor.

2.6.5 If, at any time due to reason whatsoever, it becomes necessary to remeasure the work done in full or in part, the expenses towards such remeasurement shall be borne by the contractor.

2.6.6.1 The contractor shall bear the expenditure involved, if any, in making the measurement. The Contractor shall, without extra charges, provide all the assistance with appliances with appliance and other things necessary for measurement.

2.6.7 The measurement entered in the Measurement Books and the bills prepared shall be signed and dates by both the contracting parties.

2.6.8 The Contractor will be intimated in writing by the site Engineer, the proposed date of measurement. If the contractor, representative fails to participate in the joint measurement, the BHEL engineer shall have the power to proceed by himself to take measurement in which case the measurement shall be accepted by the contractor as final.

2.6.9 Passing of measurement as per bills does not amount to acceptance of the completion of work mentioned. Any left out work has to be completed if pointed out at a later dated by BHEL.

2.7 **Rights of BHEL:**

2.7.1 To withdraw any portion of work and/or to restrict / alter the quantum of work as indicated in the contract during the progress of work and get it done through other agency and/or by departmental labour to suit BHEL's commitment to its customer or in case BHEL decides to advance the date of completion due to other emergency reasons / BHEL's obligation to its customer.

2.7.2 To terminate the contract or withdraw portion of work and get it done through other agency, at the risk and cost of the contractor after due notice of a period of 14 days' by BHEL in any of the following cases:

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) Termination of Contract on account of any other reason (s) attributable to Contractor.

v) Assignment, transfer, subletting of Contract without BHEL's written permission.

vi) Non-compliance to any contractual condition or any other default attributable to Contractor.

(#) In-case inputs from BHEL/Customer are likely to be delayed or are actually delayed, this delay may also be taken into account while considering balance period available for execution of Contract.

Risk & Cost Amount against Balance Work:

Risk & Cost amount against balance work shall be calculated as follows:

Risk & Cost Amount= [(A-B) + (A x H/100)]

Where,

A= Value of Balance scope of Work (*) as per rates of new contract

B= Value of Balance scope of Work (*) as per rates of old contract being paid to the contractor at the time of termination of contract i.e. inclusive of PVC & ORC, if any.

H = Overhead Factor to be taken as 5

In case (A-B) is less than 0 (zero), value of (A-B) shall be taken as 0 (zero).

(*) Balance scope of work (in case of termination of contract):
Difference of Contract Quantities and Executed Quantities as on the date of issue of Letter for 'Termination of Contract', shall be taken as balance scope of Work for calculating risk & cost amount. Contract quantities are the quantities as per original contract. If, Contract has been amended, quantities as per amended Contract shall be considered as Contract Quantities.
Items for which total quantities to be executed have exceeded the Contract Quantities based on drawings issued to contractor from time to time till issue of Termination letter, then for these items total Quantities as per issued drawings would be deemed to be contract quantities.
Substitute/ extra items whose rates have already been approved would form part of contract quantities for this purpose. Substitute/ extra items which have been executed but rates have not been approved, would also form part of contract quantities for this purpose and rates of such items shall be determined in line with contractual provisions.
However, increase in quantities on account of additional scope in new tender shall not be considered for this purpose.

NOTE: In-case portion of work is being withdrawn at risk & cost of contractor instead of termination of contract, contract quantities pertaining to portion of work withdrawn shall be considered as 'Balance scope of work' for calculating Risk & Cost amount.

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 as per GCC/SCC/TCC/Special note/any other annexure of tender document (in compliance with order of precedence), 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 [as per GCC/SCC/TCC/Special note/any other annexure of tender document (in compliance with order of precedence)] of the Contract for the delay attributable to contractor taking "X" as Contract Value and "T2" as period of delay attributable to contractor.

2.7.3 **Recoveries arising out of Risk & Cost and LD or any other recoveries due from Contractor**

Following sequence shall be applicable for recoveries from contractor:
a) Dues available in the form of Bills payable to contractor, SD, BGs against the same contract.
b) Demand notice for deposit of balance recovery amount shall be sent to contractor, if funds are insufficient to effect complete recovery against dues indicated in (a) above.
c) If contractor fails to deposit the balance amount to be recovered within the period as prescribed in demand notice, following action shall be taken for balance recovery:
i) Dues payable to contractor against other contracts in the same Region shall be considered for recovery.
ii) If recovery cannot be made out of dues payable to the contractor as above, balance amount to be recovered, shall be informed to other Regions/Units for making recovery from the Unpaid Bills/Running Bills/SD/BGs/Final Bills of contractor.
iii) In-case recoveries are not possible with any of the above available options, Legal action shall be initiated for recovery against contractor.

2.7.4 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 customers are terminated for any reason.

2.7.5 While every endeavour will be made by BHEL they cannot guarantee uninterrupted work due to conditions beyond their control. Contractor will not be entitled to any compensation / extra payment on this account.

2.8 Responsibilities of the Contractor:

The following are the responsibilities of the contractor in respect of observation of local laws, employment of personnel, payment of taxes and execution of job etc.

2.8.1 As far as possible, unskilled workers shall be engaged from the local areas in which the work is being executed.

2.8.2 The Contractor at all times during the continuance of this contract, shall in all his dealing 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.

2.8.3 The contractor shall comply with all state and central Laws, Statutory Rules, Regulations etc., such as:

The payment of wages Act, Minimum Wage Act, Workmen compensation Act, Employers Liability Act, Industrial Disputes Act, Employees Provident Fund Scheme,

Employees Insurance Scheme, Contract Labour (Regulation & Abolition) Act 1970 and other Acts, Rules & Regulations for labour as may be enacted by the Government during the tenure of the Contract and having force or jurisdiction at site. The Contractor shall give to the local Governing Body, Police and other relevant authorities all such notices as may be required by law.

2.8.4 The Contractor shall pay all taxes, fees, licence charges, deposits duties, tools, royalty, commission or other charges which may be leviable on account of any of his operations in executing the contract. In case, BHEL is forced to pay any of such taxes, BHEL shall have the right to recover the same from the contractor either from his bills or otherwise as deemed fit.

2.8.5 The 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 by required of same and satisfactory execution of the contract.

2.8.6 The contractor shall fulfil all his obligation in respect of accommodation including proper medical facilities for the personnel employed by him.

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

2.8.8 The Contractor shall ensure that no damage is caused to any person / property of other parties working at site. If any such damages is caused, it is the responsibility of the contactor to make the losses or compensate for the same.

2.8.9 All the properties / equipments / components of BHEL / their client loaned with or without deposit to the contractor in connection with the contract shall remain the properties of BHEL / their client. The Contractor shall use such properties for the purpose of execution of this contract. All such properties / equipment / components shall be deemed to be in good condition when received by the contractor unless he notified within 48 hours to the contrary. The Contractor shall return them in good conditions as and when required by BHEL / their client. In case of case of non-return, loss damage, repairs, etc. the cost thereof, as may be fixed by the site Engineer, will be recovered from the contractor.

2.8.10 It is not obligatory on the part of BHEL to supply any tools and tackles or other materials other than those specifically agreed to do so by BHEL. However, depending upon the availability / possibility BHEL's customers' handling equipment and other plants may be made available to the contractor on payment of the hire charges / free of charges as fixed, subject to the condition laid down by BHEL. Customer form time to time, Unless paid in advance, such hire charges if applicable shall be recovered from contractor's bill / security Deposit in one instalment.

2.8.11 The contractor shall not claim any compensation of the scope of the work, due to changes in design which curtails quantum.

2.8.12 The Contractor shall fully indemnify BHEL against all claims of whatsoever nature arising during the course of erection / overhauling / performing work under the contract.

2.8.13 In case the contractor is required to undertake any major work outside the scope of this contract the rates payable shall be decided by BHEL Resident Engineer.

2.8.14 The contractor shall keep the area of work clean and shall remove 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 to be specified by the BHEL Engineer. The contractor will also demolish all hutments, sheds, partitions, offices, 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 removed by the BHEL. The expenses thereof will be recovered from contractor.

2.8.15 The contractor shall arrange and co-ordinate his work in such a manner as to cause no inconvenience to other agencies working in the area.

2.8.16 All safety rules and codes applied by the client / BHEL at site shall be observed by the contractor without exception. The contractor shall be responsible for the safety of the equipment / material and work to be performed by him and shall maintain all light, fencing guards, signs 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 and atmospheric conditions. Suitable number of electrical staff, watch and ward, store keepers to take care of the equipment, materials and construction tools and tackles, shall be posted at site by the contractor till completion of the 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 tests of handling equipment, lifting tools, tackles etc, as per prescribed standards and practices.

2.8.17 The contractor will be directly responsible for payment of wages to his women. A pay roll sheet giving all the payments given to workers and duly signed by the contractor's representative should be furnished to BHEL site office for record purpose. BHEL site In-charge may be intimated the date of disbursement of wages to the workmen engaged for the work, so that his representative can witness the same.

2.8.18 The intent of specification, is to provide services according to most modern and proven techniques and codes. The omission of specific reference to any method, requirement or material necessary for the proper and efficient performance of work shall not relieve the contractor of the responsibility of providing such facilities to complete the work.

2.8.19 In case of any clause of the 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 BHEL Engineer.

2.8.20 No levy or payment or charge made or imposed shall be impeached by reason of any clerical error or by reason of any mistake in the amount levied or demanded or charged.

2.8.21 The details drawings, specifications, instructions manual, if any available with the BHEL Engineer will form part of tender specification. These documents will be made available for reference only to the contactor during execution of work.

2.8.22 Should any error or ambiguity be discovered in the specification or information, the contractor shall forthwith bring the same to the notice of BHEL before commencement of work. BHEL's interpretation in such cases shall be final and binding on the contractor.

2.8.23 No idle labour charges will be admissible in the event of any stoppage caused in the work resulting in contractor's labour being rendered idle due to any cause of any type.

2.8.24 **No over run charges shall be paid in the event of the completion period being extended for any reason whatsoever.**

2.8.25 It is possible that some repair/rectification, modification may be needed on the equipments to be overhauled / work to be performed under this specification, for reasons not attributions to the contractor. All such repair / rectification / modification work which can be done, with the available facilities at site shall be carried out by the contractor free of cost and no extra charges shall be paid to contractor.

2.8.26 The quality and progress of work will be regularly reviewed. The schedule and progress of work will be given to the contractor in advance and it will be the obligation / responsibility of the contractor to achieve the desired quality and progress of work by suitably reinforcing their labour force and/or by working extra hours or in more than one shift without any extra cost. Workmen found unsuitable for the work will be replaced immediately by the contractor on being informed by BHEL.

2.8.27 During the overhauling work under the contract it is very essential that proper and adequate inspection should made constantly to maintain the quality or workmanship so that any deviation from design dimension does not exceed permissible limits. The proper functioning of the unit, while in operation, depends to a great extent on the above factors. The fact that effective supervision and inspection at the execution stage is less costly than any down time of running unit even for a short period need not be over emphasized. For the details regarding alignment and permissible dimensional deviations in the sub-assembles BHEL Engineer may be consulted.

2.8.28 The contractor shall be furnish fortnightly labour report showing by classification of number of employees engaged in various categories or work date wise and submit a progress report of wok as required by BHEL Engineer.

2.8.29 The contractor shall execute the work in the most substantial and workmen-like manner in stipulated time. Accuracy of work and timely execution are the essence of this contract. The contractor shall be responsible to ensure that the assembly and workmanship conform to the dimensions and clearances given in the drawings and/or as per instructions of BHEL Engineers.

2.8.30 The contractor shall take all responsible care to protect the materials and work till such time the plant/equipment has been taken over by BHEL / their client. Where necessary, suitable temporary fencing and lighting shall have to be provided by the contractor as a safety measure against accident and damage of property of BHEL. Suitable caution notice shall be displayed where access to any part may be deemed to be unsafe and hazardous.

2.8.31 It will be the responsibility of the contractor to ensure safe lifting of the equipments taking due precautions to avoid any accidents and damage to other equipments and personnel.

2.9 **Void**

2.10 Insurance:

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

2.10.2 It is the sole responsibility of the contractor to Insure his workman against accident and injury while at work as required by relevant rules and to pay compensation, if any, to workmen as per workmen's compensation Act. Contractor shall insure his staff against accidents. 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.

2.10.3 If due to negligence and /or non-observations of safety and other precautions, any accident / injury occurs to any other person/public, the Contractor shall have to pay necessary compensation and other expenses, if so decided by the appropriate authorities. Third party insurance coverage is to be made by the contractor.

2.10.4 If due to contractor's carelessness, negligence or non-observance of safety precautions damage to BHEL's /Customer's property and personnel should occur, and if BHEL is unable to recover, in full, cost from the Insurance Company, the balance will be recovered from the Contractor.

2.11 Strikes & Lockouts :

The contractor will be fully responsible for all the disputes and other issues connected with his labour. In the event of the contractor's labour resorting to strike or the lockout declared is not settled within a period of one week BHEL shall have the right to get the work executed employing the own labour or through any other agencies or both and the cost so incurred by BHEL, shall be deducted from the contractor's bills as per clause 2.7. For all purposes whatsoever, the employees of the contractor shall not be deemed to be in the employment of BHEL.

2.12. Force Majeure :

2.12.1 The following shall amount to Force Majeure :

Acts of God, Acts of any Government, war, sabotage, riots, civil commotion, police action, revolution, flood, fire, cyclones, earthquake and epidemic and other similar causes over which the contractor has no control.

2.12.2 If the contractor suffers delay in the due execution of the contractual obligation due to delays caused by Force Majeure as defined above, the agreed time of completion of the job covered by this contract or the obligations of the Contractor shall be extended by a period of time equal to the period of delay provided that on the occurrence of any such contingency the Contractor immediately reports to BHEL in writing the causes of delay and the contractor shall not be eligible for any compensation.

2.13 Performance Guarantee:

Even though the work will be carried out under supervision of BHEL Engineers. The contractor shall guarantee against defects attributable to faulty workmanship or procedure adopted in the overhaul for items covered in the contract for a period of six months from the date of re-commissioning of the set after the capital overhaul. The guarantee should cover all defects notified during this period and shall have to be attended to free of cost immediately or at the time our clients are able to give shut down of the set for the required period. when necessary. In case of failure of contractor to attend to such defects as and when required in time, BHEL shall arrange to attend the defects and the charges shall be levied to contractor's account and shall be recoverable from the security deposit / progressive payments.

2.14. **ARBITRATION & CONCILIATION:**

2.14.1 **ARBITRATION:**

2.14.1.1 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 2.14.2 herein below 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, commence arbitration in respect of such Dispute by issuance of a notice in terms of section 21 of the Arbitration & Conciliation Act, 1996 (hereinafter referred to as the 'Notice'). The Notice shall contain the particulars of all claims to be referred to arbitration in sufficient detail and shall also indicate the monetary amount of such claim. The arbitration shall be conducted by a sole arbitrator to be appointed by the Head of the BHEL Power Sector Region issuing the Contract within 60 days of receipt of the complete Notice. The language of arbitration shall be English.

The Arbitrator shall pass a reasoned award.

Subject as aforesaid, the provisions of Arbitration and Conciliation Act 1996 (India) or statutory modifications or re-enactments thereof and the rules made thereunder as in force from time to time shall apply to the arbitration proceedings under this clause. The seat of arbitration shall be Kolkata (the place from where the contract is Issued). The Contract shall be governed by and be construed as per provisions of the laws of India. Subject to this provision 2.14.1.1 regarding ARBITRATION, the principal civil court exercising ordinary civil jurisdiction over the area where the seat of arbitration is located shall have exclusive jurisdiction over any DISPUTE to the exclusion of any other court.

2.14.1.2 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. 4(1)/2013-DPE(GM)/FTS-1835 dated 22-05-2018 as amended from time to time.

2.14.1.3 The cost of arbitration shall initially be borne equally by the Parties subject to the final allocation thereof as per the award/order passed by the Arbitrator.

2.14.1.4 Notwithstanding the existence of any dispute or differences and/or reference for the arbitration, the Contractor shall proceed with and continue without hindrance the performance of its obligations under this Contract with due diligence and expedition in a professional manner unless the dispute inter-alia relates to cancellation, termination or short-closure of the Contract by BHEL.

2.14.2 **CONCILIATION:**

If at any time (whether before, during or after the arbitral or judicial proceedings), any Disputes (which term shall mean and include any dispute, difference, question or disagreement arising in connection with construction, meaning, operation effect, interpretation or breach of the agreement, contract), which the Parties are unable to settle mutually, arise inter-se the Parties, the same may, be referred by either party to Conciliation to be conducted through Independent Experts Committee (IEC) to be appointed by competent authority of BHEL from the BHEL Panel of Conciliators.

Notes:

1. No serving or a retired employee of BHEL/Administrative Ministry of BHEL shall be included in the BHEL Panel of Conciliators.
2. Any other person(s) can be appointed as Conciliator(s) who is/are mutually agreeable to both the parties from outside the BHEL Panel of Conciliators.

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 2.3 : "Procedure for conduct of conciliation proceedings" (as available in www.bhel.com). The Procedure 2.3: "Procedure for conduct of conciliation proceedings" (as available in www.bhel.com) together with its Formats (as available in www.bhel.com) will be treated as if the same is part and parcel hereof and shall be as effectual as if set out herein in this GCC.

The Contractor hereby agrees that BHEL may make any amendments or modifications to the provisions stipulated in the Procedure 2.3 : "Procedure for conduct of conciliation proceedings" (as available in www.bhel.com) from time to time and confirms that it shall be bound by such amended or modified provisions of the Procedure 2.3 : "Procedure for conduct of conciliation proceedings" (as available in www.bhel.com) with effect from the date as intimated by BHEL to it.

2.14.3 **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.

SECTION – III
SPECIAL CONDITIONS OR CONRACT

3.1 Quantum of Work:

3.1.1 The scope of work given in the tender specification is only approximate and is liable to variation and alternation at the discretion of BHEL Resident Engineer. No compensation on this account shall be payable to the contractor unless specifically recommended by BHEL Resident Engineer as the variation forming major additions to the original scope of work. All repair / rectification work arising out of normal wear and tear, seizure of parts etc. have to be done by the contractor and the same will be covered by the scope of work of the contract.

3.1.2 The scope of work details out the major activities only. However, as per the general maintenance requirement and site condition, certain related activities may have to be carried out without any extra cost.

3.2 Commencement and completion of work :

3.2.1 The starting time and completion time is the essence of the of the tender. As the time bound programme is firmly committed to customer, the starting time and completion time should be strictly adhered to. It will be not be possible to grant extension in completion time except in extraordinary circumstance, which will be decided entirely at the discretion of BHEL Resident Engineer. Work should normally be carried out in two shifts and sometimes also in three shifts in consultation with BHEL Resident Engineer.

A detailed programme of the various activities covered under this contract with specific time period to fall in the overall frame work of the above dates should be prepared and got approved by BHEL Resident Engineer. The progress against this programme shall be reviewed with BHEL Resident Engineer at the end of each day and critical areas identified and suitable steps taken in time.

If during the review, at any stage of overhauling, BHEL Resident Engineer feels that the delays are not likely to be made up, BHEL reserves the right to take corrective steps as considered necessary by BHEL Resident Engineer to complete work in scheduled time and debit the cost incurred thereon to the contractor. This does not however absolve the contractor of his own efforts in consultation with BHEL Resident Engineer. Every endeavour will be made to see that work proceeds uninterruptedly.

3.2.2 The tenderers should indicate the time required for starting the work once the letter of intent is issued and the time required for completion. The work may have to commence immediately after opening of the tenders. Hence, preference may be given to those tenderers who can commence the work earlier, and also ensure early completion.

3.2.3 The Contractor shall ensure completion of the job in all respects within the day from the date of commencement of work as given in contract.

3.3 Penalty for delay:

3.3.1 In the event of failure to complete the work in given time, an amount equal to ½% [half percent] of the contract value per day subject to a maximum of 10% [ten percent] of the contract value will be levied as penalty, in case the balance work is allowed to be completed by the contractor beyond the scheduled time of completion, which is at the discretion of BHEL. In case of delays on contractor's part, at any stage during the scheduled period or after, BHEL shall have the option of ensuring completion of the job by any other means at its disposal and the charges on this account shall be levied on the contractor. These shall be adjusted against contractor's bills or Security Deposit.

In case of LD recovery, the applicable GST shall also be recovered from vendor.

3.4 Terms of Payment:

A minimum time of 15 days will be required for processing the bills and release of payment after the bills are presented to BHEL.

3.4.1 **As per STC**

All payments are subjects to income tax deductions @1% of the bill amount at source or as per Central Government Laws. No request for advance payment will be entertained by BHEL.

3.5 Inspection and Completion:

The work being carried out by the contractor will be supervised and inspected by our Site Engineers under the overall supervision of BHEL Resident Engineer.

3.6 The work will be deemed as complete when it is finally accepted by BHEL Resident Engineer and job completion certificate is issued. No extra payment will be made for any rework carried out by the contractor to rectify any defective work.

3.6 The contractor shall not be entitled for labour idling charges under any circumstances.

3.6 Tools, Tackles, Test Equipments & Consumables:

3.6.1 All tools and tackles and consumables required for day-to-day work like gas and gas cutting sets with accessories, AC/DC welding sets, TIG welding kits, welding cables, electrodes, all necessary power connection at his own cost. However, in case of emergency, BHEL may supply certain items if available, to contractor at actual cost plus handling charges, these will be deducted from contractors' running bills, testing equipment for conducting various tests, during the progress of overhauling / re- commissioning s h a l l have to be provided by the contractor. Spare parts going into permanent installation shall only be provided by BHEL.

3.7 Accommodation for site staff and store space:

3.7.1 Contractor has to arrange for the stores and office at site; space for the same shall be made available as per the availability at site. The contractor shall be responsible to provide all necessary facilities like residential accommodation with sanitary facilities, transport, electricity, water, medical bonus etc. as required under various labour laws and statutory rules and regulations framed thereunder to the personnel employed by him.

3.8 Responsibilities of the contractor:

3.9 Supervisory staff and labour:

The contractor shall employ, specially skilled labour, supervisor and engineers thoroughly conversant with particular type of work to ensure quality work. BHEL reserves the right to decide on the suitability of the workers and other staff employed by the contractor. BHEL reserves the right to insist on removal of any employees of the contractor at any time if they find him unsuitable and the contractor should forthwith remove him.

3.9 Planning and Execution:

Contractor shall submit a job planning in form of Bar Chart or PERT Chart. A List of manpower category wise, indicating individuals responsibility job activity wise, shall have to be submitted. Daily programme of job shall be displayed on board near work site on day in advance. A daily progress report along with Manpower utilities has to be submitted and backlog of the work, if any, shall be covered up in consultation with BHEL Resident Engineer.

3.9 Safety and Accident Coverage

Contractor shall ensure safety of all his employees at site of work. All employees shall be covered by insurance (workmen compensation) against accident, failing which proper action will be taken against the contractor.

Contractor shall ensure proper safety of the equipments under overhauling by deputing personnel to guard the equipments round the clock. Open oil spaces, steam spaces shall be covered properly against ingress of foreign materials while working.

RESPONSIBLITIES OF THE CONTRACTOR IN RESPECT OF SAFETY OF MAN, EQUIPMENT, MATERIAL AND ENVIRONMENT

3.8.3.1 Before commencing the work, contractor shall submit a 'SAFETY PLAN" to the authorised BHEL official. The 'Safety Plan' shall indicate in detail the measures that would be taken by the contractor to ensure safety of men, equipment, material and environment during execution of the work. The plan shall take care to satisfy all requirements specified here under. The contractor shall submit safety plan along with his offer. During negotiations before placing or work order and during execution of the contract, BHEL shall have right to review and suggest modifications in the safety Plan. Contractor shall abide by BHEL decision in this respect.

3.8.3.2 The contractor shall take all necessary safety precautions and arrange for appropriate appliances as per direction of BHEL or it's authorised officials to prevent loss of human lives, injuries to personnel engaged, and damage to property and environment.

3.8.3.3 The contractor shall provide to it's work force and ensure the use of the following personal protective equipment as found necessary and as directed by the authorised BHEL officials:

a. Safety Helmets conforming to IS-2925 : 1984
b. Safety Belts confirming to IS – 3521 : 1983
c. Safety shoes conforming to IS-1989 : 1978
d. Eye & Face Protection devices conforming to IS-8520 : 1987 and IS-8940 : 1978
e. Hand & body protection devices conforming to :
   IS – 2573 : 1975
   IS – 6994 : 1973
   IS – 8807 : 1973
   IS – 8513 : 1977

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

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

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

3.8.3.7 The contractor shall adopt all fire safety measures as laid down in the "Code for Fire Safety at Construction Sites' issued by the safety Department of the Construction Management (HQ) of BHEL and as per directions of the authorised BHEL official. A copy of the above referred "Code for Fire Safety at Construction Sites" shall be made available by BHEL to the contractor for reference, on demand by the contractor, during tendering stage itself.

3.8.3.8 Where it become necessary to provide and / or store petroleum products, explosives, chemicals, and liquid or gaseous fuel or any other substance that may cause fire or explosion, the contractor shall be responsible for carrying out such provisions and / or storage in accordance with the rules and regulations laid down in the relevant government acts, such as Petroleum Act, Explosives Act, Petroleum & Carbides of Calcium Manual of the Chief Controller of Explosives, Govt. of India, etc. Prior approval of the authorised BHEL official at the site shall also be taken by the contractor in all such matters.

3.8.3.9 The contractor shall arrange at his cost (wherever not specified) appropriate illumination at all work spots for safe working, when natural daylight may not be adequate for clear visibility.

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

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

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

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

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

3.8.3.15 The contractor shall submit report of the accidents, fires and property damage, dangerous occurrences, to the authorised BHEL official immediately after such occurrence, but in any case not later than twelve hours of the occurrence. Such reports shall be furnished in the manner prescribed by BHEL. In addition, periodic reports o n safety shall also be submitted by the contractor to the authorised BHEL official from time to time as prescribed.

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

3.8.3.17 If safety record of the contractor in execution of the awarded job is to the satisfaction of safety Department of BHEL, issue of an appropriate certificate to recognise the safety performance of the contractor may be considered by BHEL after completion of the jobs.

3.9 Housekeeping and preservation:

3.9 Work floor/area shall be cleaned every day and be kept absolutely clean. A regular cleaning gang may be engaged for the purpose.

All dismantled components of the equipments under overhauling should be tag marked and stored properly according to type of components, namely all loose/small parts shall be kept in boxes bearing and matching components shall be kept on wooden planks. A list of such components shall be maintained to identify / locate be preserved properly against probable damages.

No floor shall be damaged while working and necessary steps shall be taken by the contractor for repair in case of any damage.

3.9 Tools stores and Consumables:

Tools & tackles, other than special tools and tackles supplied along with the equipments, shall be arranged and kept properly by the contractor. A register must be maintained and updated regularly.

All consumables, other than those going permanently into the equipment, shall be stored by the contractor for daily use. Regular check shall be made at end of each day's work and exhausted consumables shall be replenished immediately.

The store may be visited by BHEL Engineers without notice for verification.

3.9 The contractor shall make all necessary arrangement to receive spares from BHEL/Customer's stores, as and when required. The unused and scrap materials shall be returned to BHEL / Customer's stores on completion of the work.

A detailed account shall be submitted by the contractor to this effect at the end of the work certifying no dues remained against them duly signed by Resident Engineer BHEL/Customer.

3.9 General:

3.9.1 Standard printed conditions if enclosed with the offer by the tenderers will not be accepted and only those in main body of the offer will be considered for acceptance.

3.9.2 The tenders are likely to be rejected if the tendered is not acceptable to the ultimate customer.

3.9.3 It will be the responsibility of the contractor to carry out trial run of all the equipments overhauled and confirm the satisfactory operation of equipment. The contractor's personnel shall also be present at time of final commissioning and attend to any defects that shall occur during this time.

SPECIFIC TERMS AND CONDITIONS FOR SERVICES JOBS

PSER KOLKATA

Annexure – V

A) TENDERING

1. Tenders may be submitted through Registered post with acknowledgement due, in the name of the addressee only indicated, or by hand delivery or by courier service obtaining acknowledgements of receipt. Telegraphic / Telex offers received in time can be considered, if only followed by acceptable written tender documents in accordance with the telex / telegram and does not result in any advantage over other tenderers because of any possible manipulation in price or date of completion etc.

2. Each and every page of tender documents from declaration of bidders to Annexure VI enclosed should be signed by the tenderer providing his / their seal and date as taken of their full acceptance of the scope of work, terms and conditions etc., and should be returned along with the tender offers.

3. The tenders should be quoted in English language and international numbers.

4. All entries in the tender shall be typed in ink legibly written without ambiguity.

5. Qualifications of Tenderers : for open tenders only, the tenderers who have previous experience in the similar nature of work as detailed in this tender specifications are expected to quote duly detailing their relevant experience / credentials along with the offer. Offers of other than the above are not likely to be considered. (List of similar jobs done) - Enclosure – 1

6. Financial Status : A current / valid certificate from a scheduled bank to provide the financial soundness / capability of the bidder to undertake the work, is required to be submitted along with offer. - Enclosure – 2

7. Income Tax / Sales Tax certificates : A certificate of income tax / sales tax clearance from the appropriate authority, is to be submitted in the form prescribed therefor, valid for the period of contract. - Enclosure - 3

8. Organization Chart : The organization pattern and that will be deployed by the tenderer for this work duly indicating the number of supervisors, their qualifications and experience in the line, the number of skilled and unskilled persons / etc. is required to be indicated in the offer. - Enclosure – 4

9. THE FOLLOWING DOCUMENTS SHOULD ALSO BE ENCLOSED.

   a) An attested copy of the power of attorney in case the tender is signed by an individual other than the sole proprietor.
   b) In case of an individual his full name, address, nature of business and valid trade licence.

c) In case of partnership firm, the names of all partners and their addresses. (A copy of the partnership deed / instrument of partnership, duly attested by the Notary public shall be enclosed.)

d) In case of companies, date and place of incorporation / registration including date of commencement certificate (for public companies). (Certified copies of Memorandum and articles of association are also to be furnished).

B) EARNEST MONEY DEPOSIT :

For this, please refer article 1.4 (page 4 of 23) of the General and special conditions of contract – 1991 (GSCC) enclosed / supplied with the form issued for empanelment.

C) VALIDITY OF OFFER :

The rates in the tender shall be kept open for acceptance for a minimum period of six months from the due date of opening of tenders. For details, please refer article 1.6 (page 7) of GSCC enclosed.

D) SECURITY DEPOSIT:

As per clause no. 1.8 of GENERAL & SPECIAL CONDITIONS OF CONTRACT [FOR SERVICES JOB].

Return of Security Deposit:

If the contractor duly fulfils the contractual obligations as per contrcat in all respects to the entire satisfaction of BHEL, and presents an absolute “No Demand Certificate” in the prescribed form and return properties belonging to BHEL handed over, lent or hired by him for carrying out the said works the security deposit will be released to the contractor after deducting all costs or expenses or other contracts entered into with the contractor, only after the satisfactory completion of guarantee period irrespective of release of last 10% payment. In no case Security Deposit can be released before settling all claims of BHEL on contractor under this contract.

No interest shall be payable by BHEL on Earnest Money / Security Deposit or any money due to the contractor from BHEL.

E) ACCEPTANCE / REJECTION OF TENDERS :

For this, please refer article 1.9 (pages 6 to 10) of GSCC enclosed. Also acceptance of customer is pre-requisite for consideration of bid, wherever applicable.

F) ADDITIONAL SPECIFIC TERMS AND CONDITIONS :

01. EXECUTION.

i) If the site in question is subjected to industrial relations unrest / disturbances / problems, then the successful bidder should take adequate precautionary measures against dislocation of the job on account short problems. Any liability on this account, lies entirely with the contractor.

ii) The contractor shall commence the work at site with full manpower, T&P etc. and complete as specified in the particulars of the tender. In case of any delay on the completion of work attributable to the contractor BHEL reserves full rights to cancel the contract fully or partly and to award the job in full or part to an alternate agency and recover the costs towards the same including BHEL's overheads from the contractor.

iii) In the event of termination of contract or restriction of quantum of job by our client, before or during the execution of contract, BHEL reserves the right to terminate the contract or restrict the quantum of work of sub-contractors accordingly without paying any compensation.

iv) Manpower: For various category of manpower and their numbers recommended, please refer to the Annexure IV of the tender enquiry.
The contractor shall engage proper skilled / qualified personnel and ensure the expected quality of work. If any of their personnel has been found to be unsuitable, by BHEL / or their client, the contractor shall withdraw them and provide suitable replacement immediately, failing which BHEL reserves full rights to get the job done by alternate suitable persons at risk and cost of the contractor. The delay on this account is attributable to the contractor.

v) TOOLS (TACKLES & PLANTS) : All tools, tackles and plants including precision measuring instruments, lifting devices shall have to be arranged by the contractor. (List of recommended T&P, for guidance, is provided in Annexure II of the tender enquiry). All lifting tackles and pulling devices to be used must bear valid / latest test certificates for their suitability, and the sales tax furnished along with the offer itself.

Also certificates of test / calibration with date of validity for various measuring / test instruments have to be submitted by the tenderer preferably along with the offer itself, or else the same is required to be produced at site before start of job failing which the LOI / W.O. is liable to be cancelled without any compensation.

Successful bidder shall provide valid calibration certificates for IMTEs, fitness certificates for T&Ps and Construction Equipment (e.g. wire ropes, hand operated chain pulley blocks, pulling and lifting machines, electric welding generators, arc welding transformers etc.). Calibration of IMTEs is to be arranged from the accredited agencies. Calibration certificates should have the traceability as per national/international standards. At work site the IMTEs, T&Ps and Construction Equipment shall be checked/tested/inspected by BHEL engineers. The procedure for fitness testing and storage preservation and maintenance of Construction Equipment and T&Ps shall be as per Doc. Nos. PSER:FEX:001:94, PSER:SAS(CAL):016:95 and PSER:FEX:002:94 available with BHEL site engineers.

vi) CONSUMABLES: All consumables required (list for guidance is given in Annexure III of the tender enquiry) for the job shall be arranged by the contractor

at his cost. However, any spares / components / consumables / materials going permanently into the clients equipment shall be provided to the contractor.

vii) Successful bidder has to arrange proper storing facilities at site with traceabilities for IMTEs, T&Ps, construction equipments and consumables used during job execution.

viii) All the T&Ps, consumables etc. must be mobilized at site at least three days prior to actual start of the job. They must be in accordance with those recommended in the Annexure – II and III respectively of the Tender Enquiry and must be got verified to that effect. Formal clearance in writing must be obtained from BHEL's resident engineer before the contractor starts the job.

T&P found defective / improper / insufficient or not having valid test / calibration certificate should be made good immediately.

If the contractor fails to mobilize at least 90% of the recommended T&P and manpower within the stipulated period, the order on the contractor is liable to be cancelled without paying any compensation on to him.

viii) Storage : The contractor shall be responsible for proper storing of all dismantled components, spares, T&P etc., identify them properly and preserve them throughout the execution of the job. Any loss or damage of the components caused due to the lapses attributable to the contractor or his personnel, shall be chargeable to the contractor.

ix) Transportation of Spares / materials / consumables :

Any material / components / spares required for the work must be collected by the vendor and carried safely to the work site from the point of issue in our clients premises, through his own resources and cost.

Similarly, excess materials / spares etc. must be returned to the client's stores /
any other place, within the client's premises, indicated by site-in-charge of BHEL.

Any debris, rubbish at the work spot must be cleared very day by the contractor using his own resources and cost, and disposed off at a placement for, as to be informed to him.

x) Space / Accommodation :

The contractor will be allowed to have his site office, stores etc. by erecting temporary partitions / chambers / sheds etc. at the work spot according to the availability of space, which will have to be vacated and dismantled at the end of the jobs to restore the space to the client. The contractor should make his own arrangements for the security / watch and ward.

No residential accommodation / spare can be provided by BHEL to the contractor for any residential accommodation of his personnel. Contractor has to make arrangements/accommodation at site at his cost.

xi) The contractor shall ensure responsible execution of the job and proper behavior of their personnel and observance of all the rules and regulations of our clients.

xii) Safety :

a) Standard safety norms/ regulations shall be conserved by the contractor during the execution of the job. The contractor should provide the necessary / stipulated safety devices to his personnel deputed to the site, such as grinding / welding goggles, masks, safety belts, helmets etc. No worker will be permitted to work without necessary safety appliances. Delay of work due to work without necessary safety appliances. Delay of work due to these lapses are attributable to the contractor.

b) All norms related to Health, Safety & Environmental (HSE) norms conforming to ISO-14001 & OHSAS-18001 shall be followed by successful bidder. Bidders may contact SAS-PSER office for getting detailed norms to be followed by bidder at Site

c) The contractor shall comprehensively insure all his site personnel against any hazard / accident and submit a copy of the insurance certificate covering all his site personnel to our resident engineer before commencement of work.

d) In case of any accident / hazard, the contractor shall arrange for medical attendance immediately shall compensate the personnel concerned in accordance with the workmen's compensations act in force and shall keep BHEL indemnified against any provisions of the act.

e) The successful bidder is to arrange a full set of First Aid kit for attending to manpower deployed by him at site as per requirement.

f) Successful bidder should follow all safety norms at work site. The Doc. No. PSER:PMX:004:94 in this regard is available with BHEL engineer at site.

02. STATUTORY COMPLIANCE :

i) The contractor shall comply with all state and central laws, statutory rules regulations etc. such as :

The payment of wages act, maximum wages act, workmen's compensation act., industrial disputes act, employees provident funds act / scheme, Employees' state insurance scheme, contract labour (Regulation & abolition) act, 1970 etc. and all other acts, rules & regulations for employment of labour as may have been and as may be enacted by the Government during the tenure of the contract and having force or jurisdiction at site. The contractor shall give to the local government body, police, labour authorities and other relevant authorities and all such intimation and notices as may be required by low and appraise BHEL site-in-charge of such compliance.

ii) The contractor shall pay all taxes, fees, licence charges, deposits, duties, fines, royalty commissions or other charges which may be leviable on account of any of his operations in executing the contract. In case, BHEL is forced to pay any of such taxes, BHEL shall have the right to recover the same from the contractor either form his bills or other issue as deemed fit.

iii) The contractor shall obtain requisite licence from appropriate authority of the ministry of labour under the provision of the contract labour (Regulation and abolition) Act as soon as the work is avoided to him and indemnify BHEL against the application of any provisions of the act.

iv) The contractor shall be responsible for provision of welfare and health of his employees / workmen, more particularly described in the contract labour (Regulation & abolition) act / rules, and safety precautions etc., as may be required for satisfactory execution of the contract.

v) The contractor shall fulfil all his obligations in respect of canteens, rest rooms, accommodation including proper medical facilities etc. for the personnel employed by him, more particularly described in the contract labour (regulation & abolition) act / rules.

vi) The contractor will be directly responsible for payment of wages to his workmen more specifically described in the contract labour (regulation and abolition) act / rules. A pay roll sheet showing all the wage payments representative should be furnished to BHEL site office for record purpose. BHEL site in-charge may be intimated the date of disbursement of wages to the workmen engaged for the work; so that his representative can witness the same. The contractor shall indemnify BHEL against any statutory liability on account of dues to his workmen.

vii) The bidders should be having appropriate licence from the local Boiler Inspectorate if the job involves welding of pressure parts. Also they should be having alloy steel / carbon steel high pressure welders (for PIG and submerged are welding approved by the local Boiler Inspectorate for welding the pressure parts. The bidders should clearly indicate the same in the offer.

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03. TERMS OF PAYMENT:

i) No advance shall be payable to the contractor unless specifically spelt out in the tender enquiry.

ii) A minimum time of fifteen days will be required for the processing of bills presented and for their payment.

iii)

a) 80% of the contract value shall be payable against submission of three progressive running bills. Each of the billed amount shall correspond to the quantum of job actually completed and to that effect the claim can be preferred based on percentage allotments (to be given in the work order) made. This, however, has to be certified by the resident manager / engineer of the site.

b) 10% of contract value shall be payable on submission of statutory documents & 'no due certificate from customer's personal department/receipt of final payment by BHEL from customer'.

c) Balance 10% of contract value shall be payable after successful synchronization / commissioning and on receipt of final payment by BHEL from Customer.

BHEL at its discretion may further split up the percentage break up given in billing schedule and effect payment to suit site condition, cash flow requirement etc. according to progress of work.

iv) The bidder should be financially sound to maintain the site establishment with regard to timely payment of wages to his workmen, arrangements of other inputs viz. T&P consumables etc.

Non-receipt of progressive payment from BHEL due to any reasons should not be a constraint for the smooth execution of the job at site.

v) The bidder should make all out efforts to provide all inputs in consultation with BHEL engineers at site for completing the job in the specified time frame.

vi) No over run/escalation / idle charges are payable against any services job under any circumstances. (in exceptional cases such claims may be considered provided BHEL's customer admits of such payment).

vii) Extra work rate being admitted off by BHEL for other similar contracts have been stated on the page no.10 of this annexure.

For any additional work not envisaged in the scope of work or quantities exceeding the stated quantities, these rates shall be applicable.

viii) All claims for extra works should be settled before claiming the final (10%) bill. The contractor should prefer the final claim with the certificate that 'no other claim is due from BHEL against this contract', without which final bill cannot be processed for payment.

ix) For reduction / deletion / withdrawal in the scope of work proportionate deduction in contract value will be made.

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4. PERFORMANCE:

i) As soon as job is awarded, the contractor has to submit a barchart to the resident engineer nominated showing the detailed schedule for all activities.

This schedule will be reviewed by the resident engineer from time to time to enable the contractor to recast the barchart matching the planned completion of the job.

ii) It shall be the responsibility of the contractor's supervisor to distribute the work among his workmen deployed at site and get day to day activities executed as per BHEL's requirement.

BHEL's engineers / supervisors will check the correctness of the job done and will also give the daily programme of work to the contractors supervisor. The contractor has to ensure completion of daily programme and if there is any spill over, the same has to be completed by putting in same additional resources. (Technical guidance wherever required will be provided by BHEL).

iii) The scope of work mentioned in this tender enquiry gives the broad outline of the actual work involved and it not is possible to mention all minute details of the work. For proper evaluation, the bidders may seek clarifications from this office. Or else, they may visit site and study the job content before submitting offers and be well informed and acquainted with the actual working and other prevalent conditions of the site, facilities available etc.

No claim will be entertained later on the ground of lack of knowledge. iv)

The bidders have to furnish the bio-data and experience details of the site-in-charge, other key workmen, supervisors, senior technicians etc. to be deployed. In case of award of contract, the key members of the contractor's team may be interviewed at site by BHEL's resident engineer to ascertain their suitability. Replacement of non-acceptable personnel will have to be arranged by the contractor immediately at his own cost.

v) Penalty for the delay in job completion will be 0.5% per day of delay, limiting to maximum 10% of the contract value, to be imposed on the contractor in case the delay in work completion is attributable to the lapses on the part of the contractor.

In case of LD recovery, the applicable GST shall also be recovered from vendor.

vi) Performance Guarantee: Even though the work will be carried out under supervision of BHEL Engineers, the contractor shall guarantee against defects attributable to faulty workmanship or procedure

adopted in the overhaul for items covered in the contract for a period of Six months from the date of re-commissioning of the set after the overhaul. The guarantee should cover all defects notified during this period and shall have to be attended free of cost immediately or at the time our clients are able to give shutdown of the set for the required period, when necessary. In case of failure of contractor to attend to the defect as and when required in time, BHEL shall arrange to attend the defects and the charges shall be levied to the contractor's account and shall be recoverable from the security deposit / progressive payments.

5. MISCELLANEOUS :

i) The bidders shall submit a list of jobs being carried out by them or expected to be taken up by them during the period as called for in the participation of the tender.

Enclosure – 6.

ii) The contractor has to engage a cleaning gang at site to ensure continuous cleaning of the floor at work site to protect the parts and to give safe access at the work site.

iii) Obtaining licenses / permits / road permits in connection with the fulfillment of the contractual obligations is entirely the contractors responsibility. However, wherever applicable BHEL can only offer support to the extent possible.

iv) For all matters bearing on the execution of the job at site, the decisions of the resident engineer are final and binding upon the contractor.

v) The contractor has to retain suitable minimum work force at site for a period of one month from the date of completion or work / commissioning, to attend any small / miscellaneous problems, as leakage etc.

vi) The contractor has to mobilize on a short notice (within 4 days) to attend any troubles encountered in the equipment worked on, during warranty period of six months.

vii) After dismantling and during execution of the job, successful bidder has to suitably tag the components and sub-assemblies for traceability and store properly before final assembly. This is as per Doc. Nos. PSER:PMX:002:94 & PSER:PMX:001:94.

viii) Process control of Special Processes like Welding and Heat Treatment shall be carried by successful bidder as per Doc. Nos. PSER:QLY:001:99, PSER:QLY:001:94 (3 VOL) and PSER:QLY: 003:99.

ix) Proper segregation, identification, tagging and up-keep of all dismantled items at work site during job execution have to be done by successful bidder.

x) Successful bidder is to obtain necessary "No Dues" certificates before de-mobilisation from site.

xi) Any NDT within the scope shall be as per Non-Destructive Examination manual (Doc. No. PSER:QLY:002:99 available with BHEL site engineer).

xii) Unless otherwise mentioned specifically in this tender elsewhere, the storage & preservation of components, sub-assemblies, IMTEs, T&Ps, Construction Equipments etc, maintenance of stores, watch and ward of stores and BHEL site office is in the scope of the successful bidder.

xiii) The successful bidder is to arrange extra illumination at work site to augment the existing site illumination if required to enable round-the-clock safe working.

Note: Any of the documents mentioned above can be referred before submission of tender at the office of PSER:SAS(CAL).

EXTRA WORK RATES CURRENTLY BEING ADMITTED BY BHEL, PS-ER

A. **MAN-HOUR RATE FOR ELIGIBLE EXTRA WORKS:** Single composite average labour man-hour rate, including overtime if any, supervision, use of tools and tackles and other site expenses and incidentals, consumables for carrying out any major rework/repairs/rectification/modification/fabrication as certified by site as may arise during the course of erection, testing, commissioning or extra works arising out of transit, storage and erection damages, payment, if found due will be at Rs.108/- per man hour.

B. The following all inclusive rates will be applicable for modification work involving welding of high pressure butt joints only. Extra work involving other types of joints will be done on the above manpower basis.

Unit rate per equivalent joint of size OD 63.5 mm x 6.3 mm thick

Average unit rate per equivalent joint, including NDT and stress reliving.

Carbon Steel	Rs.200/- (Rs. Two hundred only)
Alloy Steel	Rs.250/- (Rs. Two hundred fifty only)

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List of enclosure to be furnished by the bidder along with tender documents.

a)	Experience certificate	Enclosure 1 *
b)	Banker's certificate of financial soundness as per BHEL' format	Enclosure 2 *
c)	IT / ST clearance certificate	Enclosure 3.
d)	Organisation Chart	Enclosure 4. *
e)	List of concurrent jobs held by the contractor / bidder.	Enclosure 5.

(* Vendors registered with BHEL should submit documents in support of sl. no. c only.)

List of documents to be furnished by the contractor to the resident engineer before commencement of the jobs / during the execution.

i) Barchart (if not furnished in the offer)

ii) List of T&P being mobilized. Test / Calibration certificate with date of validity for lifting / pulling devices and measuring / test instrument (if not furnished in the offer).

iii) Category wise list of manpower being mobilized. iv)

List of consumables being mobilized.

v) Licence from the department of Labour under contract Labour (Regulation & Abolition) Act / Proof of Application for Lincence.

vi) ESI coverage, if applicable.

vii) Insurance certificate covering the site personnel.

viii) Proof of remittance of provident fund to the concerned authorities, for all workmen employed for this job.

ix) Third party insurance coverage.

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ANNEXURE - VI

QUESTIONAIRE TO BE FILLED IN BY THE BIDDER, SIGNED WITH DATE AND SEAL, AND TO BE RETURNED ALONG WITH TECHNICAL TENDER.

BIDDER'S NON-ACCEPTANCE OF TENDER REQUIREMENTS CAN DISQUALIFY HIS BID FOR OPENING OF "PRICE BID"

TENDER NO: PSER:SCT: DATE: ……/……/20.....

01	NAME OF THE ORGANISATION. ADDRESS, TELEPHONE / FAX NO.	: …… …… …… ……
02	MODE AND PARTICULARS OF EMD ENCLOSED	
03	BANKER'S CERTIFICATE FOR FINANCIAL SOUNDNESS / CAPABILITY TO UNDERTAKE WORK.	: Enclosed / Not enclosed.
04.	IS THE FIRM HAVING VALID TESTED / CALIBRATED TOOLS AND MEASURING INSTRUMENT REQUIRED FOR THIS TYPE OF JOB AND EQUIPMENT.	: YES / NO.
05.	ORGANISATION CHART / MANPOWER	: Enclosed / Not enclosed.
06.	STATUTORY REQUIREMENTS AS PER RELEVANT ACTS WITH LATEST AMENDMENT (Pl. tick out)	:
	i) LICENCE FOR EMPLOYING CONTRACT LABOUR	: Will be complied with
	ii) MINIMUM WAGES ACT	: - do –
	iii) INSURANCE OF SITE PERSONNEL EMPLOYED.	: - do –
	iv) WORKMEN'S COMPENSATION ACT	: - do -
	v) THIRD PARTY INSURANCE	: Will be complied with
	vi) EMPLOYEE'S LIABILITY ACT	
	vii) INDUSTRIAL DISPUTES ACT	: - do –
	viii) EMPLOYEE'S PROVIDENT FUNDS ACT	: - do –

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ix)	CONTRACT LABOUR (REGULATION AND ABOLITION) ACT / RULES	:	- do -
x)	SAFETY APPLIANCES / DEVICES FOR WORKMEN	:	- do –
xi)	BOILER INSPECTORATE	:	- do –
xii)	ARBITRATION ACT	:	- do -

07. **AGREEABILITY TO "NO OVERRUN CHARGES" CLAUSE** : Agreeable

08. **AGREEABILITY TO "NO IDLE TIME CHARGES" CLAUSE** : Agreeable

09. AGREEABILITY TO EXECUTE FULL SCOPE OF WORK OF TENDER ENQUIRY (INCLUDING RELATED MINOR ACTIVITIES). : Agreeable

Signature of the bidder :

Date :

Name of the person signing :

Designation :

SEAL

Annexure-1

INTEGRITY PACT

Between

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

and

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

Preamble

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

_____

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

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

Section 1- Commitments of the Principal

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

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

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

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

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

Section 2 - Commitments of the Bidder(s)/ Contractor(s)

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

2.1.1 The Bidder(s)/ Contractor(s) will not, directly or through any other person or firm, offer, promise or give to the Principal or to any of the Principal's employees involved in the tender process or the execution of the contract or to any third person any material, immaterial or any other benefit which he/ she is not legally entitled to, in order to obtain in exchange any advantage of any kind whatsoever during the tender process or during the execution of the contract.

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

2.1.3 The Bidder(s)/ Contractor(s) will not commit any penal offence under the relevant Indian Penal Code (IPC) 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 will 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 or take action as per the separate "Guidelines on Banning of Business dealings with Suppliers/ Contractors", framed by the Principal.

Section 4 - Compensation for Damages

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

4.2 If the Principal has terminated the contract according to Section 3, or if the Principal is entitled to terminate the contract according to section 3, the Principal shall be entitled to

demand and recover from the Contractor liquidated damages equivalent to 5% of the contract value or the amount equivalent to Security Deposit/ Performance Bank Guarantee, whichever is higher.

Section 5 - Previous Transgression

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

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

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

6.1 The Principal will enter into agreements with identical conditions as this one with all Bidders and Contractors. In case of sub-contracting, the Principal contractor shall be responsible for the adoption of IP by his sub-contractors and shall continue to remain responsible for any default by his sub-contractors.

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

Section 7 - Criminal Charges against violating Bidders/ Contractors /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 Independent External Monitor for this Pact. The task of the Monitor is to review independently and objectively, whether and to what extent the parties comply with the obligations under this agreement.

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

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

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

8.5 The role of IEMs is advisory, would not be legally binding and it is restricted to resolving issues raised by an intending bidder regarding any aspect of the tender which allegedly restricts competition or bias towards some bidders. At the same time, it must be understood that IEMs are not consultants to the Management. Their role is independent in nature and the advice once tendered would not be subject to review at the request of the organization.

8.6 For ensuring the desired transparency and objectivity in dealing with the complaints arising out of any tendering process, the matter should be examined by the full panel of IEMs jointly as far as possible, who would look into the records, conduct an investigation, and submit their joint recommendations to the Management.

8.7 The IEMs would examine all complaints received by them and give their recommendations/ views to CMD, BHEL, at the earliest. They may also send their report directly to the CVO and the Commission, in case of suspicion of serious irregularities requiring legal/ administrative action. IEMs will tender their advice on the complaints within 10 days as far as possible.

8.8 The CMD, BHEL shall decide the compensation to be paid to the Monitor 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 concerned organisation.

8.10 If the Monitor has reported to the CMD, BHEL, a substantiated suspicion of an offence under relevant Indian Penal Code/ 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 Monitor may also transmit this information directly to the Central Vigilance Commissioner, Government of India.

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

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

Section 9 - Pact Duration

9.1 This Pact shall be operative from the date IP is signed by both the parties till the final completion of contract for successful bidder and for all other bidders 6 months after the contract has been awarded. Issues like warranty / guarantee etc. should be outside the purview of IEMs.

9.2 If any claim is made/ lodged during currency of IP, 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 agreement is subject to Indian Laws and jurisdiction shall be registered office of the Principal, i.e. New Delhi.

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

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

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

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

For & On behalf of the Principal

(Office Seal)

For & On behalf of the Bidder/ Contractor

(Office Seal)

Place Kolkata

Date----------

Witness: Abhijit Pan

(Name & Address) _____

अभिजीत पान / AVIJIT PAN
उप महाप्रबंधक (प्र-प) / Dy. General Manager (PUR)
बी. एच. ई. एल./ पी.एस.ई.आर / BHEL / PSER
डी जे - 9/1,सॉल्ट लेक / DJ-9/1, SALT LAKE
कोलकाता-700 091/ KOLKATA-700 091

Witness: _____

(Name & Address) _____

Name of Contract

FIELD WELDIN (NON PR)

FOR TENDER PURPOSE ONLY, THIS WELDING SCHEDULE IS INDICATIVE ONLY, VENDOR WILL HAVE TO CARRY OUT THE JOB AS PER APPROVED EWS FOR U#5 (WILL BE PROVIDED DURING EXECUTION).

PROJECT : BARH–660 MW. EXT.CUST..1700
CONTRACTOR : BHEL
PACKAGE :
SYSTEM: PRESSURE PART ATTACHMENTS

FWS NO. :
REV.NO. :00
WELDING CODE :IBR/ASME
PAGE NO. :2/2

SL. NO.	DRG NO. FOR WELD LOCAION & IDENTIFICATION MARK	DESCRIPTION OF PARTS TO BE WELDED	MATERIAL SPEC.	DIMENSIONS SIZE	DIMENSIONS THICK	PROCESS OF WELDING	TYPE OF WELD / QTY	ELECTRODE FILLER SPEC. TIG QTY	ELECTRODE FILLER SPEC. ARC SPEC. QTY ø2.5	ø3.15	ø4.0	WPS NO. / REV. NO.	MIN. PRE. HEAT TEMP	HEAT TREATMENT TEMP. °C	HEAT TREATMENT HOLD. TIME	NDT METHOD / QUANTUM	REF. SPEC. NO.	ACC NORM REF	RE–MARKS
01	0–17–909–00687 1–16–270–01925	SEAL BAND + CROWN PLATE	SA387GR22CL2 + SA387GR22CL2		6 + 10	SMAW	5 ◺		E 9018 B3			1208/ 02	200°C	680–720	60 min	10%MPI (OR)LPI/ SHIFT	*	*	
02	0–17–909–00687	END BAR + CROWN PLATE	SA387GR12CL2 + SA387GR22CL2		36 + 10	SMAW	5 ◺		E 8018 B2			1207/ 02	150°C	680–710	90 min	10%MPI (OR)LPI/ SHIFT	*	*	
03	0–17–909–00687	SEAL PLATE + CROWN PLATE	SA387GR12CL2 + SA387GR22CL2		6 + 10	SMAW	5 ◺		E 8018 B2			1207/ 02	150°C	680–710	30 min	10%MPI (OR)LPI/ SHIFT	*	*	
04	0–17–909–00687	TIE BAR + END BAR	SA387GR12CL2 + SA387GR12CL2		36 + 36	SMAW	V		E 8018 B2			1205/ 02	200°C	NA	NA	10%MPI (OR)LPI/ SHIFT	*	*	
05	1–09–001–00850 1–09–002–00849	SEAL BOXES	SA387GR12CL2 + SA387GR12CL2		6 + 6	SMAW	6 ◺		E 8018 B2			1205/ 03	200	NA	NA	10%MPI (OR)LPI/ SHIFT	*	*	
06	0–17–909–00686	MECH. SPACER + U –ROD	SA240TY310S + SA240TY310S		10 + 12.5	SMAW	10◺		E 310			1219/ 00	10	NA	NA	10%MPI (OR)LPI/ SHIFT	*	*	

PREPARED	CHECKED (DESIGN)	CHECKED (W.T.C)	APPROVED	DATE	DRAWING NO:	REV.NO.
A.K. DIXIT	KS	PRAVEEN	KS	05.11.2019	4–12–992–14897	00

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* REFER NDE MANUAL No.PS: CMX: 002 REV.No.01/12–98

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Name of Contractor/Subcontractor

(NON–PP)

FIELD WELDING SCHEDULE

PROJECT : BARH–660 MW. EXT.CUST..1700

CONTRACTOR : BHEL

PACKAGE :

SYSTEM: PRESSURE PART ATTACHMENTS

FWS NO. :

REV.NO. :00

WELDING CODE :IBR/ASME

PAGE NO. :2/2

SL. NO.	DRG NO. FOR WELD LOCAION & IDENTIFICATION MARK	DESCRIPTION OF PARTS TO BE WELDED	MATERIAL SPEC.	DIMENSIONS SIZE	DIMENSIONS THICK	PROCESS OF WELDING	TYPE OF WELD / QTY	ELECTRODE FILLER SPEC. TIG QTY	ARC SPEC. QTY ø2.5	ø3.15	ø4.0	WPS NO. / REV. NO.	MIN. PRE. HEAT TEMP	HEAT TREATMENT TEMP. °C	HEAT TREATMENT HOLD. TIME	NDT METHOD/ QUANTUM	REF. SPEC. NO.	ACC NORM REF	REMARKS
07	0–17–909–00684	CAS.BAFFLES + U CLIP	SA240TY304 + SA240TY304		5 + 5	SMAW	5 ◺		E 308			1217/ 00	NIL	NA	NA	10%MPI (OR)LPI/ SHIFT	*	*	
08	0–17–909–00685	CAS.BAFFLES + U CLIP	SA240TY304 + SA240TY304		2.5 + 2.5	SMAW	2.5◺		E 308			1217/ 00	NIL	NA	NA	10%MPI (OR)LPI/ SHIFT	*	*	

PREPARED	CHECKED (DESIGN)	CHECKED (W.T.C)	APPROVED	DATE	DRAWING NO:	REV.NO.
AK DIXIT	KS	PRAVEEN	KS	05.11.2019	4–12–992–14898	00

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Name of Contractor/Subcontrac

FIELD WELDING SCHE & ECO (PP)

PROJECT : BARH–660MW (CUST.NO.1700)
CONTRACTOR :
CONTRACT NO: BHEL
SYSTEM : BARH MODIFICATION

DOC.NO: 9560–102–01–TR–QVM–V–007
REV.NO. :
WELDING CODE : IBR/ASME
PAGE NO. : 1/2

SL. NO.	DRG NO. FOR WELD LOCAION & IDENTIFICATION MARK	DESCRIPTION OF PARTS TO BE WELDED	MATERIAL SPEC.	DIMENSIONS SIZE	DIMENSIONS THICK	PROCESS OF WELDING	TYPE OF WELD / QTY	ELECTRODE FILLER SPEC. TIG QTY	ARC SPEC. QTY ø2.5	ø3.15	ø4.0	WPS NO. / REV. NO.	MIN. PRE. HEAT TEMP	HEAT TREATMENT TEMP. °C	HEAT TREATMENT HOLD. TIME	NDT METHOD / QUANTUM	REF. SPEC. NO.	ACC NORM REF	RE–MARKS
01	0–00–027–44972	ECO OUT HDR E–09 + ECO ASSY E–06U NEW + ECO ASSY E–06U	SA210GR.C + SA210GRC	ø44.5 + ø44.5	8.0	TIG ARC	8 ▽	ER70S–A1	E–7018–1			1003/04	20	–	–	20% RT MIN 2 WELD/ WELDER/SHIFT	*	*	01
							1624NOS	12018	19488										
02	0–00–027–44972	ECO ASSY E–06U NEW HGR + HANGER TUBE S–19	SA213 T12 + SA213 T12	ø57.2 + ø57.2	12.7	TIG ARC	12.7 ▽	ER80S–B2	E–8018–B2			1009/03	150	–	–	20% RT MIN 2 WELD/ WELDER/SHIFT	*	*	01
							816NOS	6672	9792	5712									
03	0–00–027–44972	LTRH ASSY R–04U NEW (ACCESS COILS) + LTRH ASSY R–04U (ACCESS COILS)	SA213 T23 + SA213 T23	ø63.5 + ø63.5	4.0	TIG	4 ▽	2CRWV TIG				1052/06	200	730 – 760	60	20 % RT & 80 % PAUT	*	*	100 % HC 260 HB MAX 04 03
							64NOS	4096											
04	0–00–027–44972	LTRH LOOSE TUBES R–07 NEW + LTRH UPPER R–04U NEW	SA213 T91 + SA213 T91	ø63.5 + ø63.5	4.57	TIG	4.6 ▽	ER90S–B9	E–9015–B91			1036/08	220	730 – 760	30	20 % RT & 80 % PAUT	*	*	100 % HC 300 HV MAX 04 03 01
							808NOS	11312	6464										
05	0–00–027–44972	HANGER TUBES S–19 + LTRH UPPER R–04U NEW HGR + LTRH UPPER R–04U HGR	SA213 T12 + SA213 T12	ø63.5 + ø63.5	12.7	TIG ARC	12.7 ▽	ER80S–B2	E–8018–B2			1009/03	150	–	–	20% RT MIN 2 WELD/ WELDER/SHIFT	*	*	01
							816NOS	8078.4	11424	5712									
06	0–00–027–44972	LTRH PENDENT R–07 NEW + LTRH PENDANT LOOSE TUBES R–07 NEW + LTRH PENDANT R–07	SA213 T91 + SA213 T91	ø63.5 + ø63.5	5.0	TIG ARC	5 ▽	ER90S–B9	E–9015–B91			1036/08	220	730 – 760	30	20 % RT & 80 % PAUT	*	*	100 % HC 300 HV MAX 04 03 01
							2424NOS	33209	21816										
07	0–00–027–44972 FIELD CUTTING FOR ERECTION	BP ROOF PANEL S–21 LOOSE TUBES + BP ROOF PANEL S–21 LOOSE TUBES	SA213 T12 + SA213 T12	ø44.5 + ø44.5	8.0	TIG ARC	8 ▽	ER80S–B2	E–8018–B2			1009/03	150	–	–	20% RT MIN 2 WELD/ WELDER/SHIFT	*	*	01
							400NOS	2960	4800										
08	0–00–027–44972 FIELD CUTTING FOR ERECTION	BP SIDE PANEL S–12U + BP SIDE PANEL S–12U	SA213 T12 + SA213 T12	ø57.2 + ø57.2	9.4	TIG ARC	9.4 ▽	ER80S–B2	E–8018–B2			1009/03	150	–	–	20% RT MIN 2 WELD/ WELDER/SHIFT	*	*	01
							200NOS	1900	1000										
09	0–00–027–44972 FIELD CUTTING FOR ERECTION	ECO. OUTLET HDR SUPPORT TUBES S–19 + ECO. OUTLET HDR SUPPORT TUBES S–19	SA213 T12 + SA213 T12	ø57.2 + ø57.2	12.7	TIG ARC	12.7 ▽	ER80S–B2	E–8018–B2			1009/03	150	–	–	20% RT MIN 2 WELD/ WELDER/SHIFT	*	*	01
							80NOS	664	960	560									
10	0–00–027–44972 FIELD CUTTING FOR ERECTION	ECO. OUTLET LINK EF–01 + ECO. OUTLET LINK EF–01 SPOOL PIPE	SA106GRC + SA106GRC	ø508 + ø508	71.5	TIG ARC	63 ▽▽	ER70S–A1	E–7018–1			1004/04	150	610 ± 15	180	100 % RT	*	*	01
							2 NOS	270	76	126	1056								
11	0–00–027–44972 FIELD CUTTING FOR ERECTION	BP REAR PANEL S–20U/I + BP REAR PANEL S–20U/I	SA213 T12 + SA213 T12	ø44.5 + ø44.5	8.0	TIG ARC	8 ▽	ER80S–B2	E–8018–B2			1009/03	150	–	–	20% RT MIN 2 WELD/ WELDER/SHIFT	*	*	01
							816NOS	6038	9792										
12	0–00–027–44972	LTRH ASSY R–04U NEW + LTRH ASSY R–04U	SA213 T91 + SA213 T91	ø63.5 + ø63.5	4.0	TIG	4 ▽	ER90S–B9				1036/08	220	730 – 760	30	20 % RT & 80 % PAUT	*	*	100 % HC 260 HB T23 300 HV T91 MAX 04 03
							744NOS	47616											

PREPARED	CHECKED (DESIGN)	CHECKED (W.T.C)	APPROVED	DATE	DRAWING NO:	REV.NO.
ANEET	S.ANAND KUMAR	L.PRAVEEN KUMAR	S.ANAND KUMAR	22.06.2018	4–17–992–03597	04

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Name of Contractor/Subcontractor

FIELD WELDING SCHEDULE

PG(S) : 17

PG NAME : SH, RH,CIRCU& ECO (PP)

PROJECT : BARH-660MW (CUST.NO.1700)
CONTRACTOR :
CONTRACT NO: BHEL
SYSTEM : BARH MODIFICATION

DOC.NO: 9560-102-01-TR-QVM-V-007
REV.NO. :
WELDING CODE : IBR/ASME
PAGE NO. : 2/2

SL. NO.	DRG NO. FOR WELD LOCAION & IDENTIFICATION MARK	DESCRIPTION OF PARTS TO BE WELDED	MATERIAL SPEC.	DIMENSIONS SIZE	DIMENSIONS THICK	PROCESS OF WELDING	TYPE OF WELD / QTY	ELECTRODE FILLER SPEC. TIG / QTY	ARC SPEC. QTY ø2.5	ø3.15	ø4.0	WPS NO. / REV. NO.	MIN. PRE. HEAT TEMP	HEAT TREATMENT TEMP. °C	HOLD. TIME	NDT METHOD / QUANTUM	REF. SPEC. NO.	ACC NORM REF	REMARKS
13	0-06-751-01153 & 0-06-751-01156	FURN VERT WALL AD-1 & RT-1 OPNG + FURN VERT WALL(F-19U,F-19UI)	SA 213T22 + SA 213T22	ø38.1 + ø38.1	9.5	TIG ARC	9.5 V	ER90S-B3	E-9018-B3			1084/00	200	730 – 750	60	20% RT MIN 2 WELD/ WELDER/SHIFT	*	*	
							64 NOS	308	960										
14	1-11-684-02850 & 1-11-684-02852	EXT PASS RT-2 & AD-3 OPNG + EXT PASS PNL (S-07)	SA213 T23 + SA213 T23	ø57.2 + ø57.2	7.6	TIG ARC	7.6 V	2CRWV TIG	CROMET 23L/CM2W			1052/06	200	730 – 760	60	20 % RT & 80 % PAUT	*	*	100 % HC 260 HB MAX 01
							40 NOS	432	520		02								

FOR TENDER PURPOSE ONLY, THIS WELDING SCHEDULE IS INDICATIVE ONLY, VENDOR WILL HAVE TO CARRY OUT THE JOB AS PER APPROVED EWS FOR U#5 (WILL BE PROVIDED DURING EXECUTION).

PREPARED	CHECKED (DESIGN)	CHECKED (W.T.C)	APPROVED	DATE	DRAWING NO:	REV.NO.
ANEET	S.ANAND KUMAR	L.PRAVEEN KUMAR	S.ANAND KUMAR	19.01.2018	4-17-992-03744	02

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ERECTION WELDING SCHEDULE

PG NO : 21

CUST No : 1700,1701

PG NAME : Soot Blower

PROJECT : NTPC / BARH Stage II Unit 4, 660 MW

SYSTEM DESCRIPTION : Soot Blower piping

WELDING CODE : IBR / ASME

PRESSURE PARTS/~~NON PRESSURE PARTS~~

CUST DOC NO : - CUST DOC REV : -

SL. NO	DRG NO. FOR WELD LOCATION & IDENTIFICATION MARK	DESCRIPTION OF PARTS TO BE WELDED	MATERIAL SPEC.	DIMENSIONS		PROCESS OF WELDING	TYPE OF WELD	ELECTRODE FILLER SPEC				WPS NO/REV NO.	MIN. PRE HEAT TEMP. in °C	PWHT TEMP. in °C	NDT METHOD/ QUANTUM	* REF-.		REMARKS	REV
								GTAW	SMAW										
				SIZE	THICK		Qty in Nos.	Qty in gms	Qty in Nos. Ø2.5	Ø3.15	Ø4.0			TIME in mins		SPEC. NO	ACC NORM REF.		
1	0-21-600-00396	PIPE + REDUCER	SA335P91 + SA182F22CL3	127	20	GTAW + SMAW	20 ▽▽	ER90S-B3	E9018-B3			1035/05	220	740-770	100% RT				
							1	41	10	15	12			60					
2	0-21-600-00396	REDUCER + PIPE	SA182F22CL3 + SA335P22	73	5.16	GTAW + SMAW	5.16 ▽	ER90S-B3	E9018-B3			1013/02	150	Nil	20% RT subject to min 2 weld/ welder/ shift				
							1	20	10	-	-								
3	0-21-600-00396	PIPE + VALVE	SA335P22 + SA182F22CL1	73	5.16	GTAW + SMAW	5.16 ▽	ER90S-B3	E9018-B3			1013/02	150	Nil	20% RT subject to min 2 weld/ welder/ shift				
							4	78	38	-	-								
4	0-21-600-00397	TEE + PIPE	SA182F22CL3 + SA335P22	60.3	5.54	SMAW	7 ◺	-	E9018-B3			1020/01	150	Nil	100% LPI or MPI				
							36	-	146	-	-								
5	0-21-600-00397	PIPE + BEND	SA335P22 + SA335P22	60.3	5.54	GTAW + SMAW	5.54 ▽	ER90S-B3	E9018-B3			1013/02	150	Nil	20% RT subject to min 2 weld/ welder/ shift				
							52	788	456	-	-								
6	0-21-600-00399	PIPE + BEND	SA335P22 + SA335P22	73	5.16	GTAW + SMAW	5.16 ▽	ER90S-B3	E9018-B3			1013/02	150	Nil	20% RT subject to min 2 weld/ welder/ shift				
							76	1469	713	-	-								
7	0-21-600-00399	PIPE + REDUCER	SA335P22 + SA182F22CL3	73	5.16	GTAW + SMAW	5.16 ▽	ER90S-B3	E9018-B3			1013/02	150	Nil	20% RT subject to min 2 weld/ welder/ shift				
							9	174	85	-	-								
8	0-21-600-00399	PIPE + REDUCER	SA182F22CL3 + SA335P22	60.3	5.54	GTAW + SMAW	5.54 ▽	ER90S-B3	E9018-B3			1013/02	150	Nil	20% RT subject to min 2 weld/ welder/ shift				
							1	16	9	-	-								
9	0-21-600-00399	REDUCER + PIPE	SA335P22 + SA182F22CL3	60.3	5.54	GTAW + SMAW	5.54 ▽	ER90S-B3	E9018-B3			1013/02	150	Nil	20% RT subject to min 2 weld/ welder/ shift				
							4	61	36	-	-								
10	0-21-600-00399	PIPE + REDUCER	SA182F22CL3 + SA335P22	73	5.16	GTAW + SMAW	5.16 ▽	ER90S-B3	E9018-B3			1013/02	150	Nil	20% RT subject to min 2 weld/ welder/ shift				
							4	78	38	-	-								

PREPARED	CHECKED (W.T.C)	APPROVED	DATE	DOC NO.	REV NO :	PAGE NO.
SAJI P J		V GUNASEKARAN		1700-21-SBP-EWS	X	1/2

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ERECTION WELDING SCHEDULE

CUST No : 1700,1701
PROJECT : NTPC / BARH Stage II Unit 4, 660 MW
WELDING CODE : IBR / ASME
PRESSURE PARTS/~~NON PRESSURE PARTS~~

PG NO : 21
PG NAME : Soot Blower
SYSTEM DESCRIPTION : Soot Blower piping
CUST DOC NO : - CUST DOC REV : -

SL. NO	DRG NO. FOR WELD LOCATION & IDENTIFICATION MARK	DESCRIPTION OF PARTS TO BE WELDED	MATERIAL SPEC.	DIMENSIONS		PROCESS OF WELDING	TYPE OF WELD	ELECTRODE FILLER SPEC				WPS NO/REV NO.	MIN. PRE HEAT TEMP.	PWHT TEMP. in TIME in mins	NDT METHOD/ QUANTUM	* REF-.		REMARKS	REV
								GTAW	SMAW										
				SIZE	THICK		Qty in Nos.	Qty in gms	Qty in Nos.							SPEC. NO	ACC NORM		
									Ø2.5	Ø3.15	Ø4.0								
11	0-21-600-00399	PIPE + VALVE	SA182F22CL1 + SA335P22	73	5.16	GTAW + SMAW	5.16 ▽	ER90S-B3	E9018-B3			1013/02	150	Nil	20% RT subject to min 2 weld/ welder/ shift				
							8	155	76	-	-								
12	0-21-600-00399	PIPE + TEE	SA335P22 + SA234WP22CL1	88.9	5.49	GTAW + SMAW	5.49 ▽	ER90S-B3	E9018-B3			1013/02	150	Nil	100% RT				
							4	97	51	-	-								
13	0-21-600-00399	TEE + REDUCER	SA234WP22CL1 + SA182F22CL3	88.9	5.49	GTAW + SMAW	5.49 ▽	ER90S-B3	E9018-B3			1013/02	150	Nil	100% RT				
							8	193	102	-	-								
14	0-21-600-00399	PIPE + REDUCER	SA182F22CL3 + SA335P22	73	5.16	GTAW + SMAW	5.16 ▽	ER90S-B3	E9018-B3			1013/02	150	Nil	20% RT subject to min 2 weld/ welder/ shift				
							8	155	76	-	-								
15	0-21-600-00399	PIPE + VALVE	SA182F22CL1 + SA182F22CL3	60.3	5.54	GTAW + SMAW	5.54 ▽	ER90S-B3	E9018-B3			1013/02	150	Nil	20% RT subject to min 2 weld/ welder/ shift				
							8	122	71	-	-								

PREPARED	CHECKED (W.T.C)	APPROVED	DATE	DOC NO.	REV NO :		PAGE NO.
SAJI P J		V GUNASEKARAN		1700-21-SBP-EWS	X		2/2

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PPA DRAWINGS		
S. No.	**Drawing No.**	**Description**
1	0-00-027-35233	BOILER PR PARTS ARRANGEMENT
2		SKETCH FOR FINAL SH COIL CUTTING LOCATION
3		PLATEN SH SKETCH FOR INNER MOST ELEMENT(23 &24) REMOVAL
4		LOAD TRANSFER ARRANGEMENT FOR ERECTION OF NEW LTRH HORIZONAL COIL & ECONOMIZER COIL
5	CON:SV:73059T	SEPERATOR SAFETY VALVE
6	CON:SV:730170	SEPERATOR SAFETY VALVE
7	0-00-027-44970	PPA-COMPOSITE SECTIONAL SIDE ELEVATION
8	0-00-027-44971	PPA-SECTIONAL SIDE ELEVATION (UPP FURN)
9	0-00-027-44972	PPA-SECTIONAL SIDE ELEVATION BACKPASS
10	0-00-027-44974	PPA-FRONT ELEV "E1-E1" ECONOMISER
11	0-00-027-45040	PPA-FRONT ELEV "E2-E2" LTRH ASSYS
12	0-00-027-44985	PPA-PLAN VIEW "B1-B1" & "C1-C1"
13	0-00-027-45026	PPA-ARRGT AT BP STM COOL SUPPT OUTLET HDR
14	0-00-027-45027	PPA- ECON OUT HDR SUPPT TUBES-SHEET 1 OF 2
15	0-00-027-45028	PPA- ECON OUT HDR SUPPT TUBES-SHEET 2 OF 2
16	0-00-027-45015	PPA-PANEL ARRGT -FURNACE VERTICAL WALL
17	0-00-027-45018	PPA-PANEL ARRGT -BACKPASS
18	0-00-027-45034	PPA-PANEL ARRGT FURN ROOF & BP ROOF
19	0-00-027-45039	PPA-FIELD WELDED ATTACHMENT BACKPASS
20	0-00-027-45029	PPA-ECON OUT HDR & LTRH INLET HDR

PRESSURE PARTS		
S. No.	**Drawing No.**	**Description**
1	0-16-270-02725	ARRANGEMENT OF PROTECTION SHIELD ON LTRH R-04
2	0-16-270-02727	AGT OF PROTECTION SHIELD ON LTRH PENDENT
3	0-17-909-00684	ECON CASSETTE BAFFLE ARRG'T
4	0-17-909-00685	LTRH CASEETE BAFFLE AGT
5	1-19-851-02108	ARRGT.OF ECO.OUTLET LINK (CIRCUIT EF-01)
6	3-19-851-06805	ECO OUTLET LINK SPOOL(MK NO EF-01-SPOOL)
7	1-09-001-00850	LOCATION OF SEAL BOXES FOR OPENING
8	1-09-001-00396	SEALBOX FOR ACCESS DOOR OPENING (AD -1)
9	1-09-001-00400	SEALBOX FOR ACCESS DOOR OPENING (AD -3)
10	1-09-001-00403	SEALBOX FOR ACCESS DOOR OPENING (AD -5)
11	2-09-001-01040	SEALBOX FOR AS. ST.BLOWER OPENING(RT-1)
12	2-09-001-01041	SEALBOX FOR AS. ST.BLOWER OPENING(RT-2)
13	1-09-002-00849	LOCATION OF SEAL BOX FOR INST INS
14	3-09-002-00515	PRESSURE TAPPING ASSEMBLY
15	3-09-002-00514	TEMP.TAPPING ASSY
16	3-09-002-00518	ASLD TAPPING ASSY.
17	3-12-903-03372	CASSETTE BAFFLE SLIDING ARRESTOR ARRANG
18	1-16-270-01926	ARRGT. OF ATTCH. ON LTRH PENDANT ASSEMBLY (R-07 NEW-01)
19	1-16-270-01927	ARRGT. OF ATTCH. ON LTRH PENDANT ASSEMBLY (R-07 NEW)
20	2-11-767-15515	ASMBLY&DETAIL OF RT-3 OPENING(S-12U)
21	1-11-767-04015	ASMBLY & DETAIL OF AD-5 OPENING(S-12U)
22	1-11-769-04014	ASMBLY & DETAIL OF AD-5 OPENING(S-12L)
23	0-06-751-01156	ASSEMBLY OF RT-1 OPENING (FURNACE
24	0-06-751-01153	ASSEMBLY OF AD-1 OPENING (FURNACE)
25	1-11-684-02852	ASSEMBLY OF AD-3 OPENING (EXTENDED PASS
26	1-11-684-02850	ASSEMBLY OF RT-2 OPENING (EXTENDED PASS)
27	2-09-001-01042	SEAL BOX ASSY FOR SOOT BLOWER (RT-3)
28	0-18-001-xxxxx	Roof Skin Casing

L & I		
S. No.	**Drawing No.**	**Description**
1	0-00-205-20969	WIND BOX & SOFA DUCTS INSUL.& REF ARRGNT
2	0-00-205-20970	BOILER BUCKSTAY INSUL. & REF ARRANGEMENT
3	0-00-205-20971	REAR ARCH ENCL. INSUL. & REF ARRANGEMENT

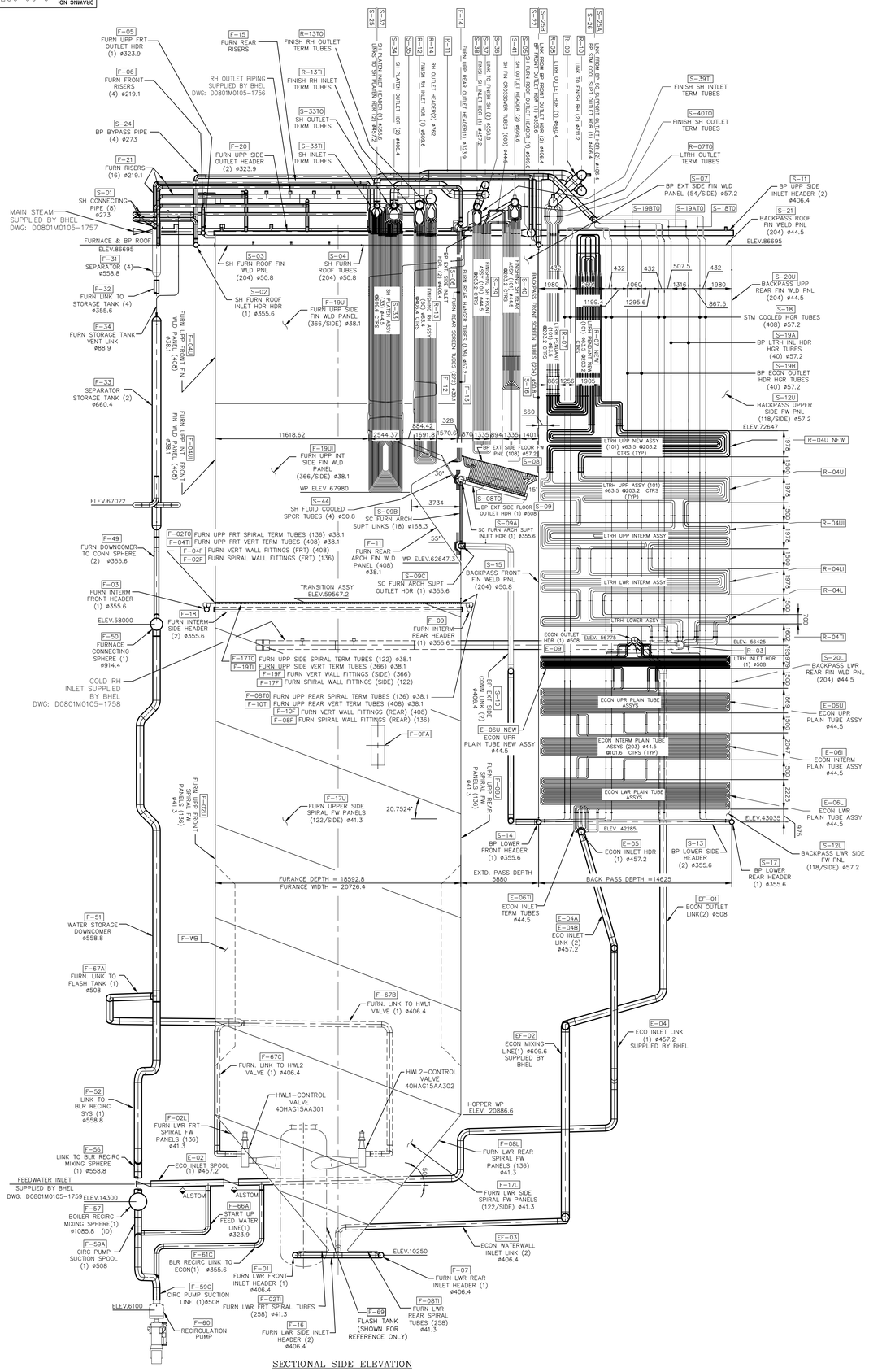
4	0-00-205-20972	FURNACE HEADERS INSUL. & REF ARRANGEMENT
5	0-00-205-20973	PENT HOUSE INSULATION & REF ARRANGEMENT
6	0-00-205-20974	FURNACE ROOF INSULATION & REF ARRANGEMEN
7	4-00-205-08525	APPLICATION & CURING OF CASTABLE REF
8	4-00-205-08526	APPLICATION & CURING OF CASTABLE REF
9	4-00-205-08527	APPLICATION & CURING OF CASTABLE REF
10	4-00-205-08528	APPLICATION & CURING OF POURABLE INSUL.
11	4-00-205-08529	APPLICATION & CURING OF POURABLE INSUL.
12	0-00-230-21854	LOCATION OF FURNACE DOORS
13	0-00-230-21855	FIXING DETAILS OF ADE IN ROOF ENCLOSURE
14	0-00-230-21856	FIXING DETAILS OF SCAFFOLD DOOR
15	0-00-230-21857	REFRACTORY ARRANG FOR INSTRUMENT TAPPING
16	1-00-230-06921	FIXING DETAILS OF ACCESS DOOR IN ENCL
17	1-00-230-06922	FIXING DETAILS OF OBD IN FURNACE
18	1-00-230-06923	FIXING DETAILS OF ACCESS DOOR IN FURNACE
19	1-00-230-06924	FIXING DETAILS OF WATER COOLED AD
20	0-00-205-24261	REFRACTORY ARRGT. IN EXT. PASS FLOOR TUBES
21	0-00-205-24263	ANTI VIBRATION BAFFLES
22	0-00-205-24264	ANTI VIBRATION BAFFLES

BUCKSTAY		
S. No.	**Drawing No.**	**Description**
1	0-08-901-06210	Assembly of furnace Upper key Buckstays (backpass side wall)
2	0-08-901-06211	Assembly of furnace Upper key Buckstays (backpass Rear wall)

STRUCTURES		
S. No.	**Drawing No.**	**Description**
1	0-36-391-25583	BARH-II MODIFICATION ADD. PF @68.1,74.1 & 77.3 M
2	0-36-391-25584	BARH-II MODIFICATION ADD. PF @71.1 M
3	0-36-391-25585	BARH-II MODIFICATION ADD. PF @40.1 & 55.5 M
4	1-35-850-03806	FIXING ARRANGEMENT OF FLOOR GRILL - 32 MM TK
5	1-36-820-31332	VERICAL LADDER
6	3-36-811-00401	FIXING ARRANGEMENT OF HAND RAILS, HAND RAIL POST AND GUARD PLATE

BOILER MOUNTINGS		
S. No.	**Drawing No.**	**Description**
1	0-00-047-47888	P&ID of Sootblower System 1/2, Remarks: LRSB addition
2	0-00-047-47888	P&ID of Sootblower System 2/2, Reamarks: LRSB addition
3	0-21-600-00397	SOOT BLOWER PIPING & SUPPORTS, Reamarks: LRSB addition
4	2-21-600-00080	GENERAL ERECTION NOTES, Reamarks: LRSB addition
5	3-21-600-00029	LRSB REAR END SUPPORT , Reamarks: LRSB addition
6	3-21-601-00260	SINGLE TIE ROD HANGER-2", Reamarks: LRSB addition
7	3-21-601-00583	SINGLE TIE ROD HANGER-2" WITH SCA, Reamarks: LRSB addition
8	3-21-601-00658	PIPE SADDLE -2", Reamarks: LRSB addition
9	0-21-600-00396	SOOTBLOWER PR.REDUCTION STATION, Remarks: APH SB Line size modification
10	0-21-600-00399	SOOTBLOWER PIPING AND SUPPORTS(FOR AHSB), Remarks: APH SB Line size modification
11	2-00-047-47003	SITE WELDING DETILS FOR HANGER ASSY, Remarks: APH SB Line size modification
12	1-00-047-47130	BOILER TRIM PIPING, Remarks: APH SB Line size modification

DRAWING NO: 0-00-027-35233



SCOPE COVERED UNDER MODIFICATION							
SL.NO	DESCRIPTION	DIA (MM)	THICK (MM)	MAT. SPEC.	DESIGN PRESSURE kg/cm²(g)	DESIGN TEMP °c	PG-MA	DRAWING NUMBERS
1	LTRH PENDENT NEW ASSY	63.5	5.0	SA213T91	71.0	569.6	16-270	1-16-270-01925
2	LTRH PENDENT TERM TUBES	63.5	5.0	SA213T91	71.0	569.6	16-270	1-16-270-01924
3	LTRH PENDENT TERM TUBES	63.5	5.0	SA213T91	71.0	569.6	16-270	3-16-270-02060 TO 3-16-270-02087 2-16-270-07802
4	LTRH UPPER ASSY	63.5	4.57	SA213T91	71.0	533	16-201	0-16-201-02526 TO 0-16-201-02536 & 3-16-201-02096
		63.5	4.0	SA213T23	71.0	533	16-201	
		57.2	12.7	SA213T12	284.8	507.4	16-201	
5	ECONOMISER UPPER ASSY	44.5	8.0	SA210GRC	301.0	358.6	19-894	0-19-894-02073 TO 0-19-894-02081
		57.2	12.7	SA213T12	284.8	507.4	19-894	

BOILER DESCRIPTION:-

TOP SUPPORTED
SLIDING PRESSURE SUPERCRITIAL
WELDED WATER WALL
SPIRAL WOUND CONSTRUCTION
TILTING TANGENTIAL FIRING

DESCRIPTION OF THE MODIFICATION:-

1.PENDANT LTRH , LTRH UPPER AND ECONOMISER HEAT SURFACE AREA ADDITION.

2.FINISH SH REAR HEAT SURFACE AREA REMOVAL.

3.CUTTING OF EXISTING LTRH BOTTOM AND LTRH TERM TUBE ADDITION.

4.ECONOMISER OUTLET HDR ELEVATION CHANGE.

5.ADDITION OF OPENING AFTER CUTTING THE PNL.

	EXISTING HEAT SURFACE AREA	HEAT SURFACE AREA AFTER MODIFICATION
LTRH PEND	2900 SQ.MTRS	6480 SQ.MTRS
LTRH HORIZ	14543 SQ.MTRS	18961 SQ.MTRS
TOTAL	17443 SQ.MTRS	25441 SQ.MTRS
ECONOMIZER	27344 SQ.MTRS	32858 SQ.MTRS
FINISH SH REAR	3703 SQ.MTRS	2403 SQ.MTRS

NOTES:-

1. BOILER DESIGN PRESSURE:---------- 268.7 Kg/sq.cm (g)
2. BOILER DESIGN TEMPERATURE:---------- 568°C
3. SUPERHEATER OUTLET PRESSURE:------- 255.0 Kg/sq.cm (g)
4. SUPERHEATER OUTLET TEMPERATURE:----- 568°C
5. REHEATER OUTLET PRESSURE:--------- 54.65 Kg/sq.cm (g)
6. REHEATER OUTLET TEMPERATURE:------- 596°C
7. REHEATER DESIGN PRESSURE:----------71.0 Kg/sq.cm(g)
8. DESIGN CODE :---------- AS PER IBR
9. MANUFACTURING & INSPECTION:-- AS PER IBR
10. HYDRAULIC TEST PRESSURE AT SITE:
    A.) FOR BOILER (INCLUDING ECONOMISER & SH)------:335.9 Kg/sq.cm (g)
    B.) FOR REHEATER :----------:88.7 Kg/sq.cm (g)

FOR TENDER PURPOSE ONLY

BOILER REGISTRY NO :

UNIT 5 – BR/9231

CUST NO -1701

CAUTION: The information on this drawing is property of BHARAT HEAVY ELECTRICALS LTD. It must not be disclosed to others or used in any manner detrimental to the interest of the company.

TYPE OF PRODUCT OR NAME OF CUSTOMER/PROJECT: BARH SUPER THERMAL POWER STATION STAGE - II (2 X660MW)-UNIT 5

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

	NAME	SIGNATURE	DATE
DRN	SAI KUMAR		04.09.2020
CHD	NIRMAL RAJ		05.09.2020
APPD	SRIDHARAN		07.09.2020

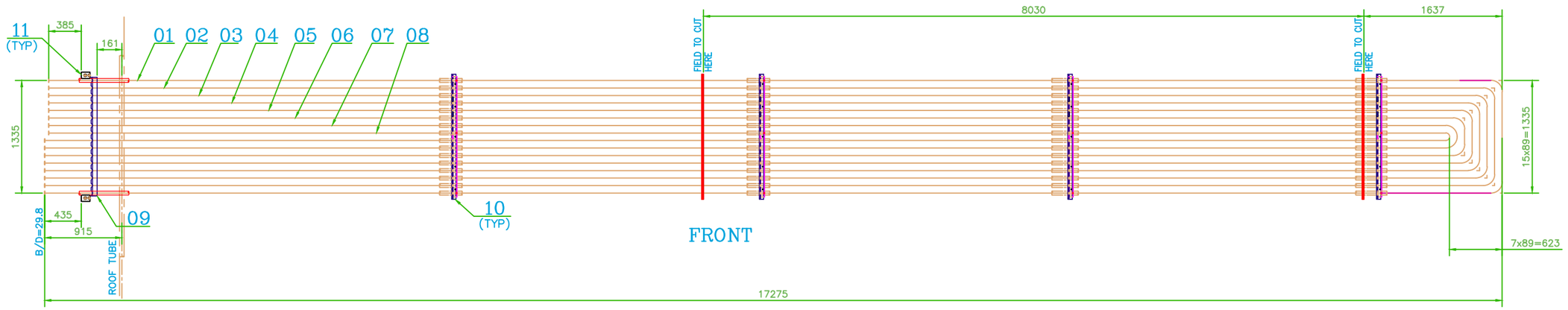
REV	DATE	ALTERED :
01		CHD & APPD :

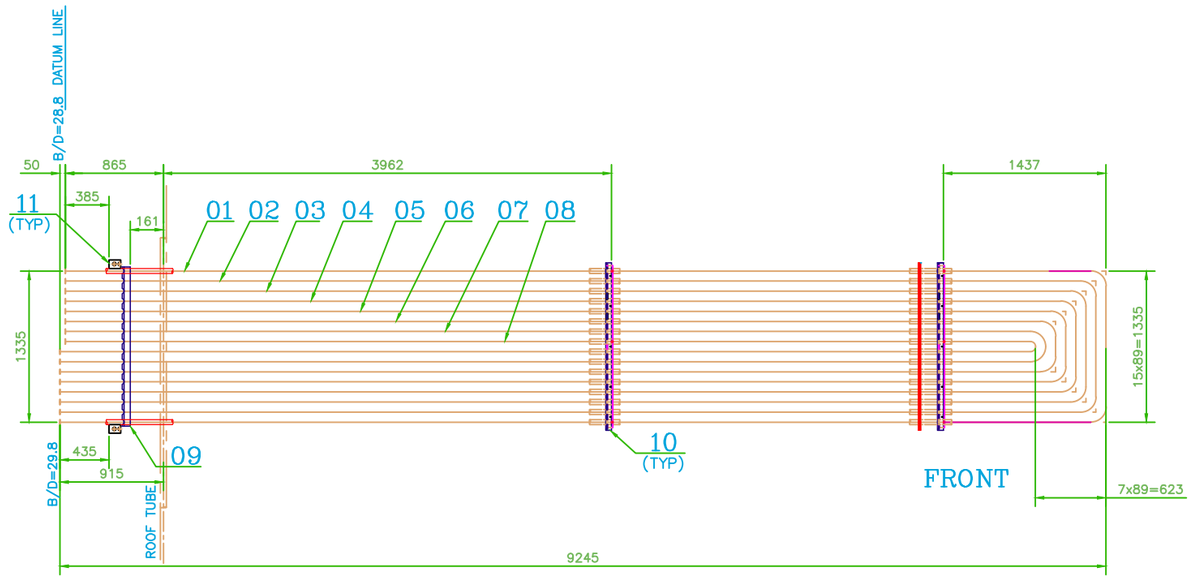
DEPT PP | CODE 121 | ALL DIMENSIONS ARE IN MM | PROJECTION | SCALE NTS | WEIGHT (Kg) ----- | REF TO ASSY / OLD DWG

TITLE: BOILER PRESSURE PART ARRANGEMENT

DRAWING NO : 0-00-027-35233 | REV 00

FOR TENDER PURPOSE ONLY

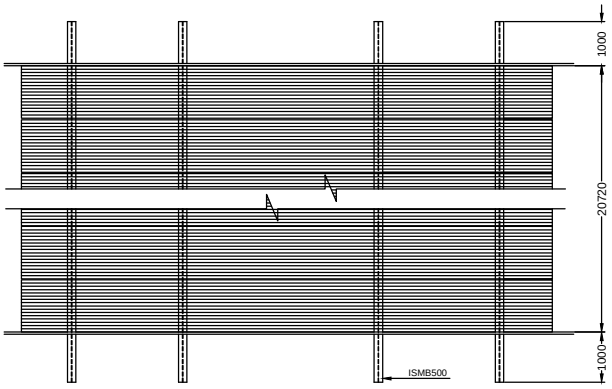




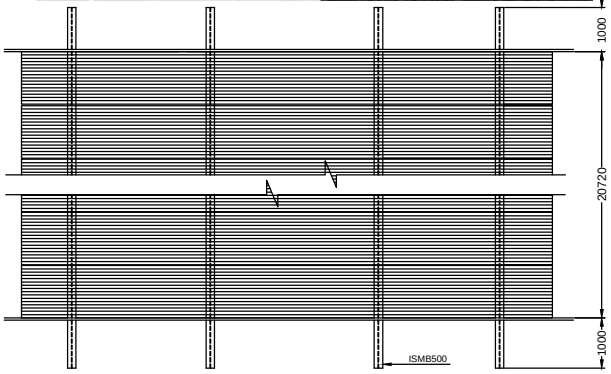
ALL CUT LOCATIONS AND FINAL LENGTH ARE INDICATIVE AND NOT FINAL.

BOM

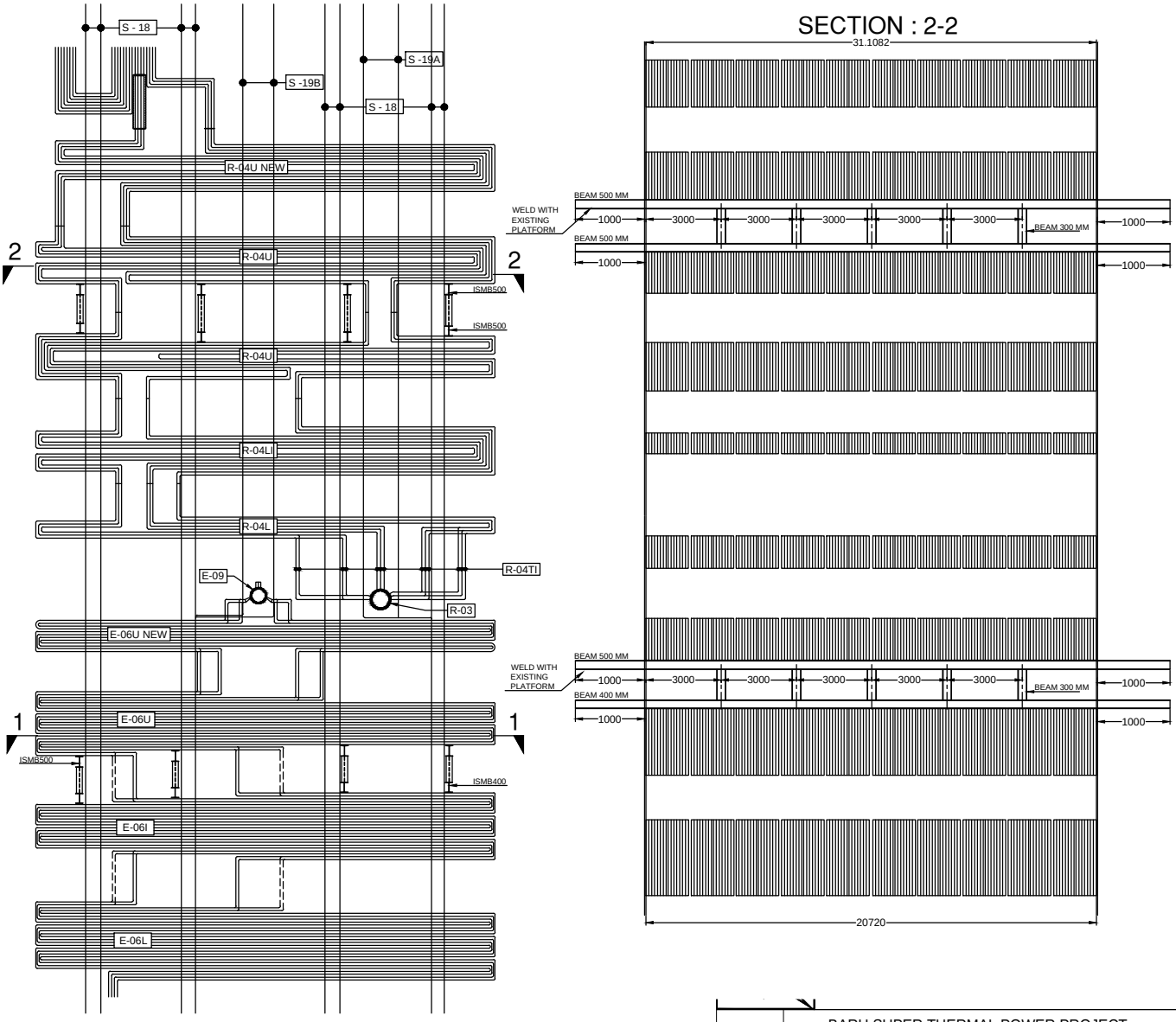
SR.NO.	SECTION/PROFILE	LENGTH	QTY.	UNIT WT.	WEIGHT
1	ISMB 500	22750	12	86.9	23723.7
2	ISMB 400	22750	4	61.5	5596.5
3	ISMB 300	AS SUITABLE TO SITE			
			TOTAL WT. (KG)		29320.2



SECTION : 1-1



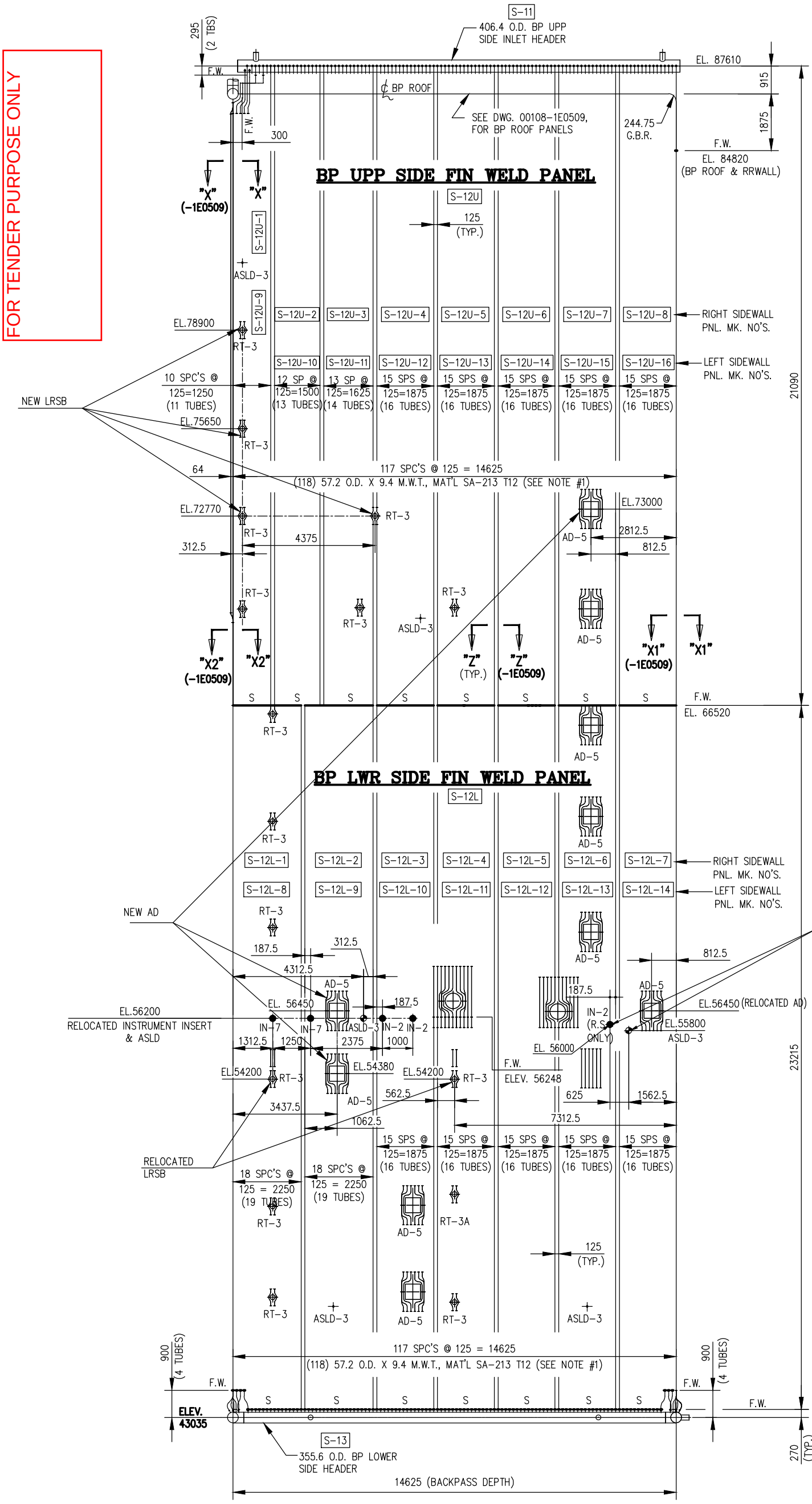
SECTION : 2-2



FOR TENDER PURPOSE ONLY

CLIENT	BARH SUPER THERMAL POWER PROJECT					
TITLE	LOAD TRANSFER ARRANGEMENT WORK OF LTRH HORIZONTAL & ECONOMIZER ERECTION IN 660MW BOILER AT NTPC BARH					
NTS	NR.	DN.		29.11.19	DRAWING NO.	REV.
SCALE	DRAWN	CHECKED	APPROVED	DATED	BEIPL/BSTP/LTA/001	02

FOR TENDER PURPOSE ONLY



BACKPASS RIGHT SIDEWALL
(AS SHOWN & NOTED)

BACKPASS LEFT SIDEWALL
(OPPOSITE & NOTED)
ELEVATION VIEW-CASING SIDE

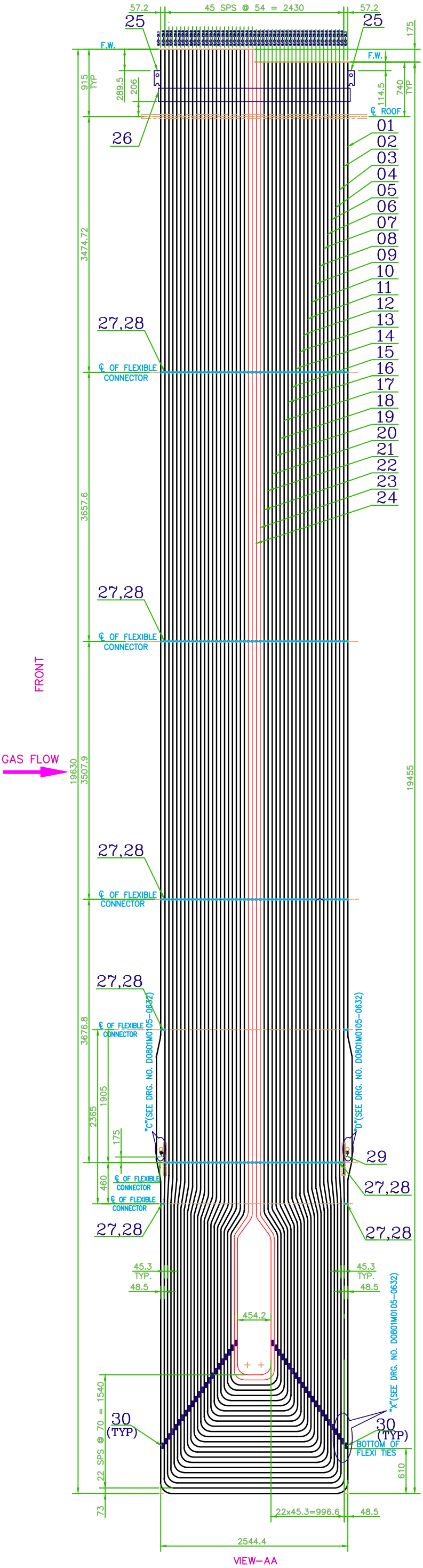
1700 – BARH MODIFICATION

LOCATION OF NEW & RELOCATED OPENINGS IN BACKPASS

DT: 09.12.19

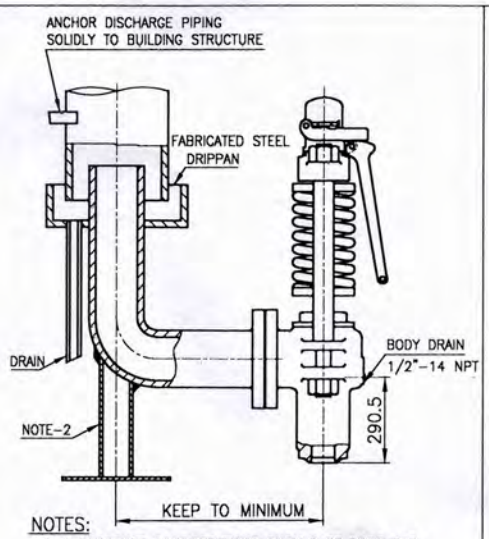
PREPARED : MEP

CHECKED : MH

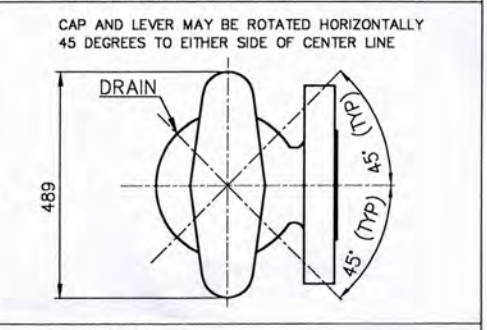


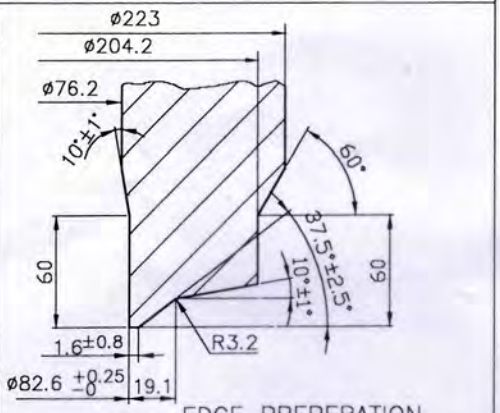
FOR TENDER PURPOSE ONLY

ALL DIMENSIONS ARE IN MM

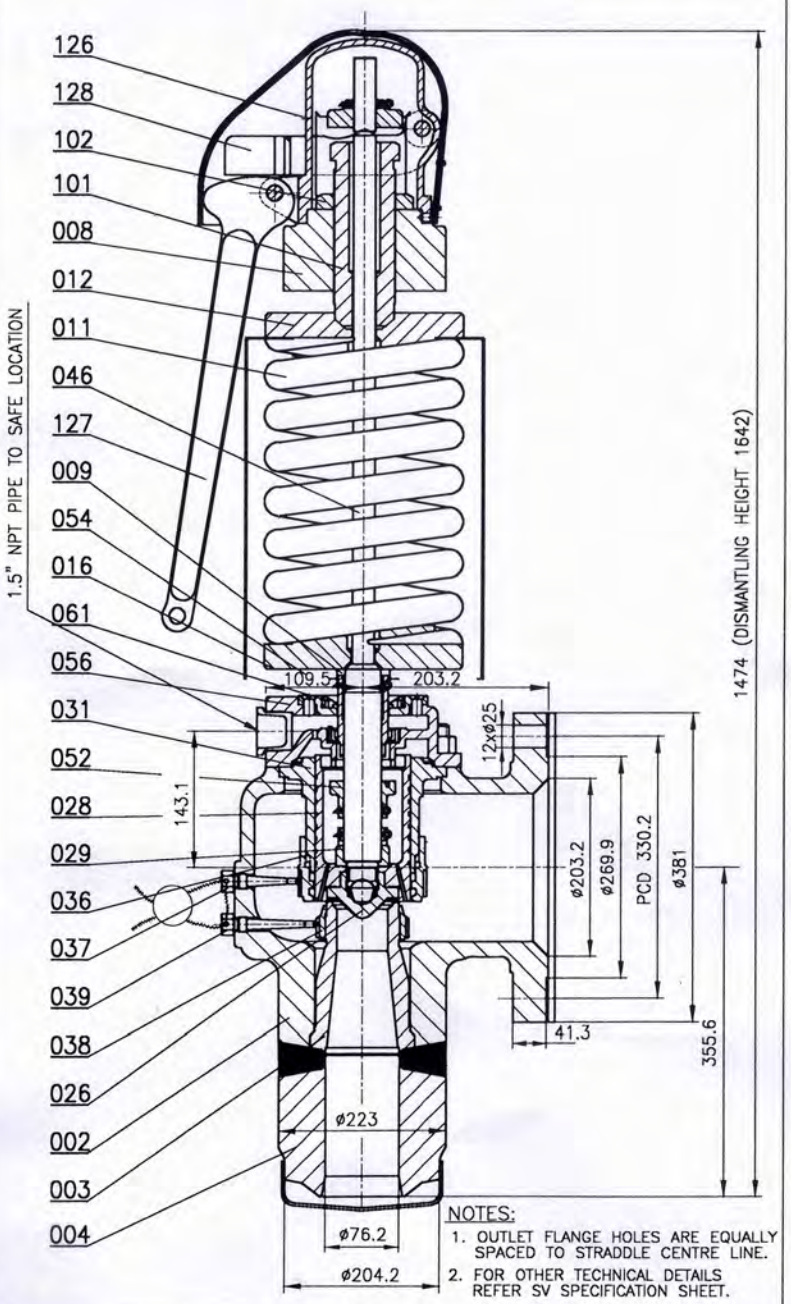


NOTES:
1. APPROPRIATE CONSIDERATIONS SHOULD BE MADE FOR DRAINING ANY CONDENSATE WHICH MAY ACCUMULATE IN THE COVER PLATE VENT PIPING.
2. ADDITIONAL SUPPORT MAY BE PROVIDED TO WITHSTAND BLOWING REACTION





EDGE PREPERATION



NOTES:
1. OUTLET FLANGE HOLES ARE EQUALLY SPACED TO STRADDLE CENTRE LINE.
2. FOR OTHER TECHNICAL DETAILS REFER SV SPECIFICATION SHEET.

COMP. NO.	PARTS	MATERIALS	COMP. NO.	PARTS	MATERIALS
002	BASE	SA217-WC9	038	LOWER ADJ.RING	STAINLESS STEEL
003	SEAT BUSHING	F347H SS	039	LOWER ADJ.RING PIN	STAINLESS STEEL
004	INLET NECK	SA182-F22	046	SPINDLE	STAINLESS STEEL
008	YOKE	CARBON STEEL	052	LIFT STOP	STAINLESS STEEL
009	YOKE ROD	ALLOY STEEL	054	OVERLAP COLLAR	STAINLESS STEEL
011	SPRING	ALLOY STEEL	056	COVER PLATE	ALLOY STEEL
012	TOP SPG WSHR ASSY	CARBON STEEL	061	TOP PLATE	ALLOY STEEL
016	BOTTOM SPG WSHR	CARBON STEEL	101	SPRING ADJUSTER	COPPER NICKEL ALLOY
026	DISC	INCONEL ALLOY	102	SPG.ADJ.LOCK NUT	COPPER NICKEL ALLOY
028	DISC HOLDER	MONEL ALLOY 505	126	CAP	CARBON STEEL
029	DISC COLLAR	STAINLESS STEEL	127	DROP LEVER	CARBON STEEL
031	GUIDE	MONEL ALLOY 505	128	TOP LEVER	CARBON STEEL
036	UPPER ADJ. RING	STAINLESS STEEL			
037	UPPER ADJ. RING PIN	STAINLESS STEEL			

ORIFICE	4
AREA	25.66 sq.cm.
LIFT	14.29 mm.
APP. WEIGHT	420 kg.
INLET	3"-BUTT WELD
OUTLET	8"-300# ANSI B16.5, RF SMF.
SPECIALITIES	90% LIFT & SPL EP
ASSY. PART NO.	73059T4100

BHEL RESERVES THE RIGHT TO THE USE OF ALTERNATE / EQUIVALENT MATERIALS.

365-128/A 08.09.2020

TITLE: SAFETY VALVE (174AWP:SPL)

DRG. NO.: CON:SV:73059T

REV.: 00

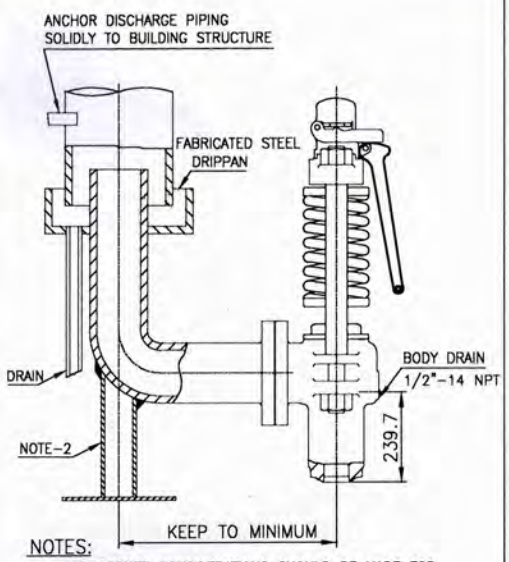
PRE	J.Dhanabal	21.09.2020
CHD	R.Rabin	21.09.2020
APP	S.Madhulingam	21.09.2020

BHARAT HEAVY ELECTRICALS LTD., TIRUCHY-14

Size A4

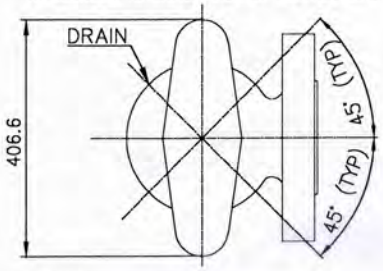
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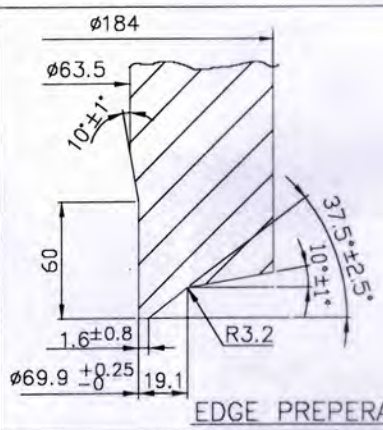
ALL DIMENSIONS ARE IN MM



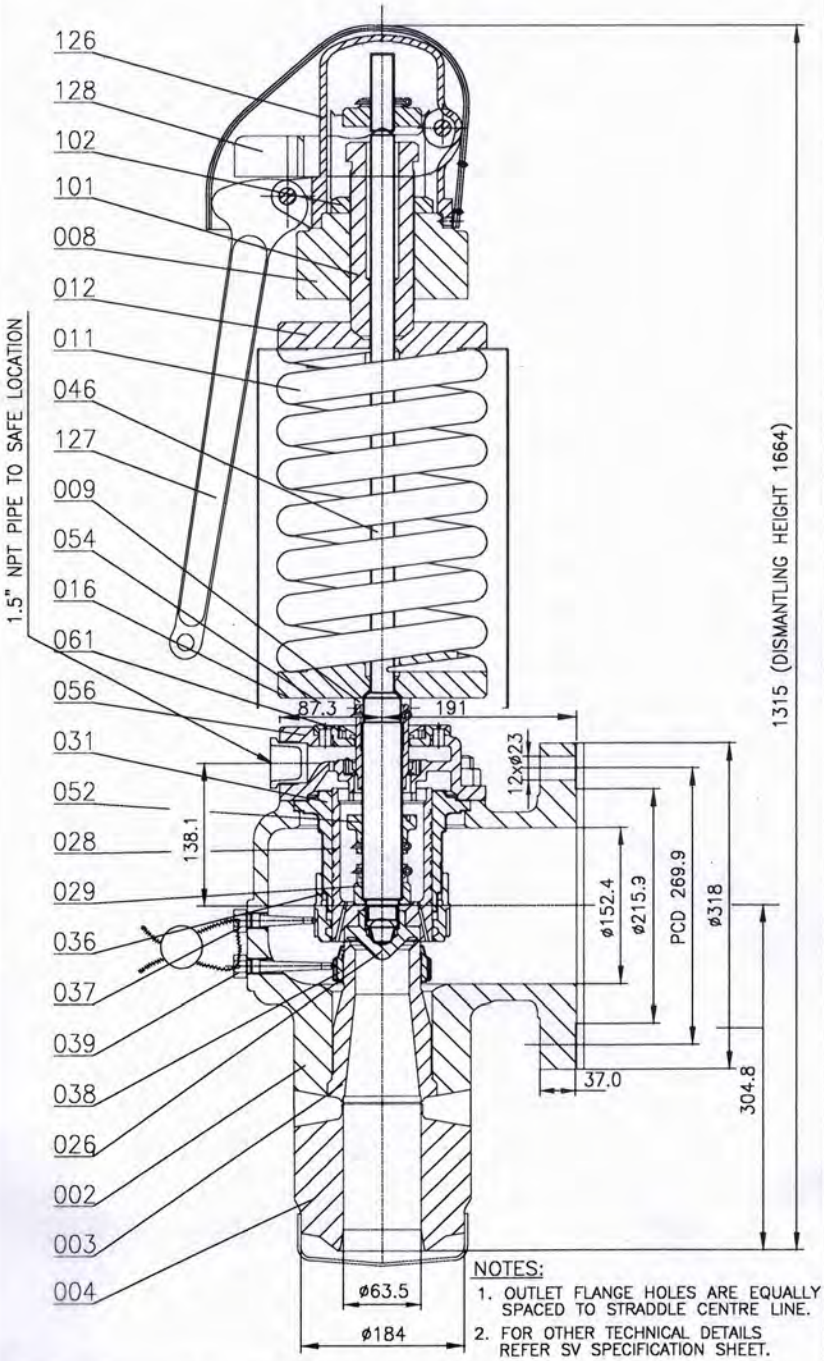
NOTES:
1. APPROPRIATE CONSIDERATIONS SHOULD BE MADE FOR DRAINING ANY CONDENSATE WHICH MAY ACCUMULATE IN THE COVER PLATE VENT PIPING.
2. ADDITIONAL SUPPORT MAY BE PROVIDED TO WITHSTAND BLOWING REACTION

CAP AND LEVER MAY BE ROTATED HORIZONTALLY 45 DEGREES TO EITHER SIDE OF CENTER LINE





EDGE PREPERATION



NOTES:
1. OUTLET FLANGE HOLES ARE EQUALLY SPACED TO STRADDLE CENTRE LINE.
2. FOR OTHER TECHNICAL DETAILS REFER SV SPECIFICATION SHEET.

COMP. NO.	PARTS	MATERIALS	COMP. NO.	PARTS	MATERIALS
002	BASE	SA217-WC9	038	LOWER ADJ.RING	STAINLESS STEEL
003	SEAT BUSHING	F347H SS	039	LOWER ADJ.RING PIN	STAINLESS STEEL
004	INLET NECK	SA182-F22	046	SPINDLE	STAINLESS STEEL
008	YOKE	CARBON STEEL	052	LIFT STOP	STAINLESS STEEL
009	YOKE ROD	ALLOY STEEL	054	OVERLAP COLLAR	STAINLESS STEEL
011	SPRING	ALLOY STEEL	056	COVER PLATE	ALLOY STEEL
012	TOP SPG WSHR ASSY	CARBON STEEL	061	TOP PLATE	ALLOY STEEL
016	BOTTOM SPG WSHR	CARBON STEEL	101	SPRING ADJUSTER	COPPER NICKEL ALLOY
026	DISC	INCONEL ALLOY	102	SPG.ADJ.LOCK NUT	COPPER NICKEL ALLOY
028	DISC HOLDER	MONEL ALLOY 505	126	CAP	CARBON STEEL
029	DISC COLLAR	STAINLESS STEEL	127	DROP LEVER	CARBON STEEL
031	GUIDE	MONEL ALLOY 505	128	TOP LEVER	CARBON STEEL
036	UPPER ADJ. RING	STAINLESS STEEL			
037	UPPER ADJ. RING PIN	STAINLESS STEEL			

ORIFICE	3
AREA	11.487 sq.cm.
LIFT	8.00 mm.
APP. WEIGHT	318 kg.
INLET	2.5"-BUTT WELD
OUTLET	6"-300# ANSI B16.5, RF SMF.
SPECIALITIES	LIFT RESTRICTED TO 70%
ASSY. PART NO.	7301704100

BHEL RESERVES THE RIGHT TO THE USE OF ALTERNATE / EQUIVALENT MATERIALS.

365-128

TITLE: SAFETY VALVE (173AWP:SPL)

DRG. NO.: CON:SV:730170

REV.: 00

PRE	J.Dhanabal	19.10.2020
CHD	R.Rabin	19.10.2020
APP	S.Madhulingam	19.10.2020

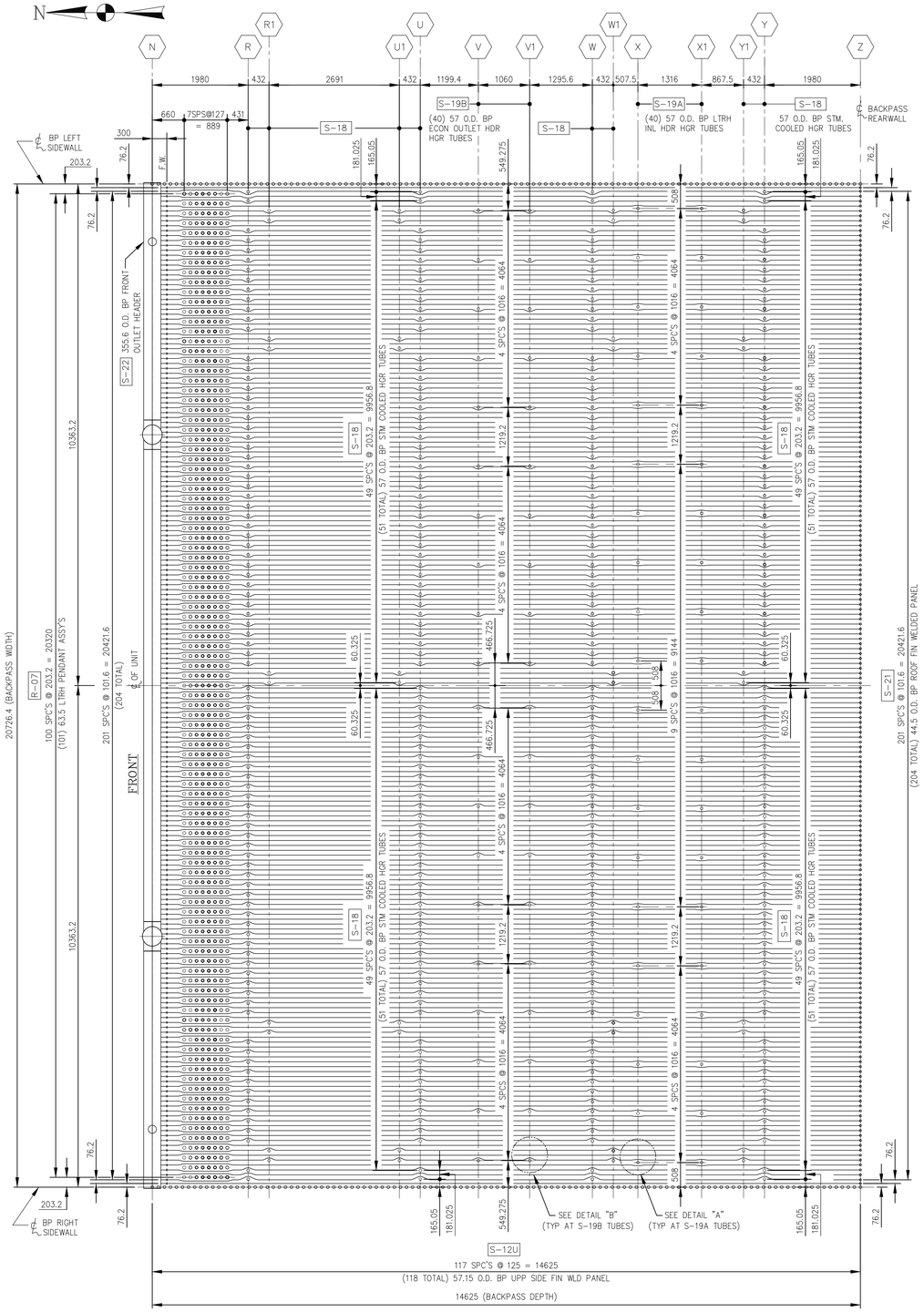
BHARAT HEAVY ELECTRICALS LTD., TIRUCHY-14

Size A4

2-24-880-0396)

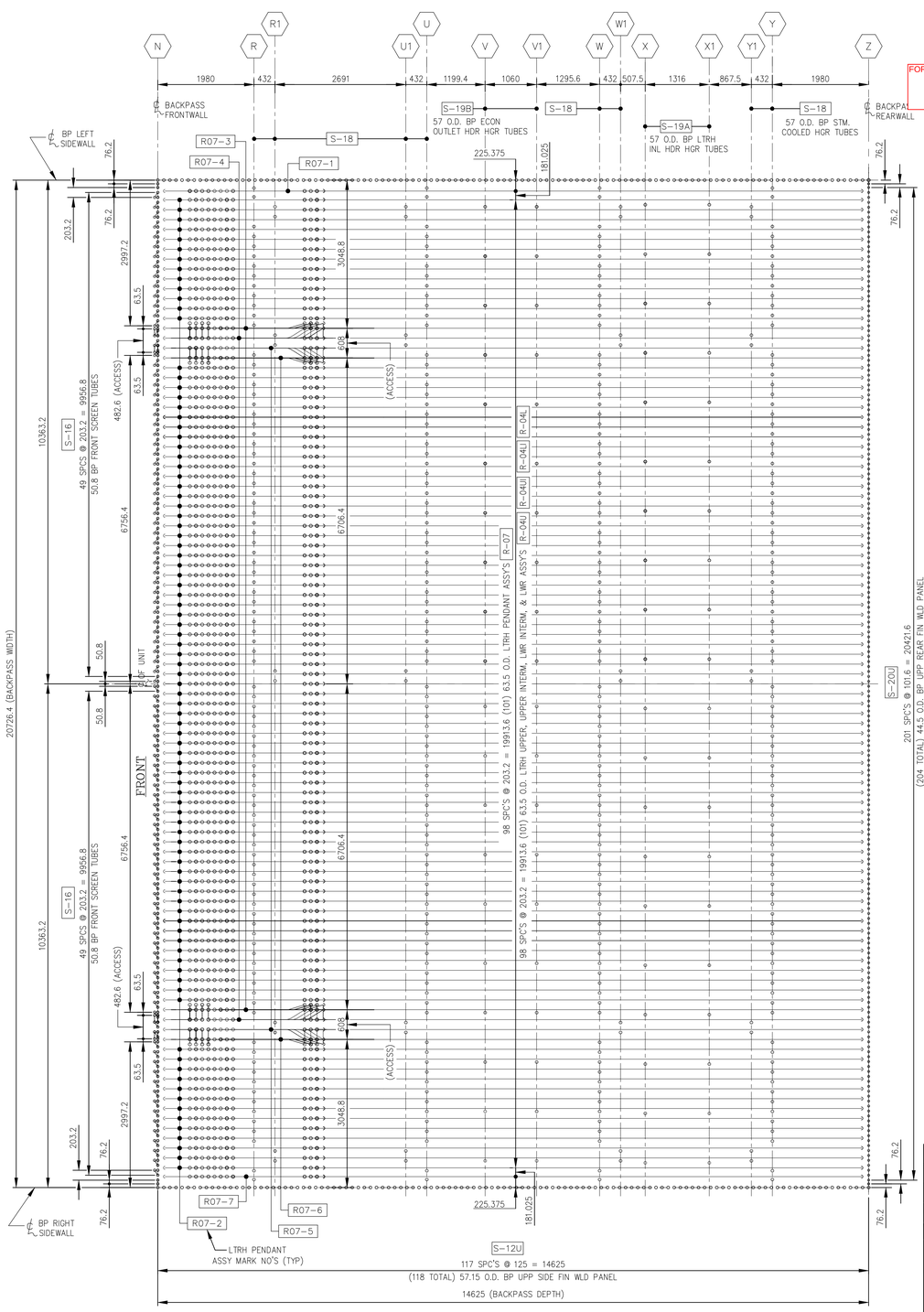
E-TENDER ENQUIRY NO.: PSER:PUR:BRH-S434:20 (ENQ:20:PP:0015:PUR:88) Date 05/03/2021.

00108–1E0116	REVISION	01	DRW GMD 06/02/09	CHK CC 07/02/09	APP JMH 06/04/09	UPDATED LOCATION OF S–18 TUBES AT ℄ UNIT PER LATEST DESIGN AND UPDATED GEOMETRY OF S–21 PANELS ACCORDINGLY.	02	DRW JDF 01 JUL 10	CHK CDS 01 JUL 10	APP PTS 01 JUN 10	C2– REVISED PER MARKED PRINTS FROM FIELD OPERATIONS. ADDED DWG ZONE LOCATIONS TO DETL'S "A" & "B".



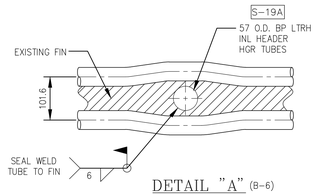
PLAN VIEW "B1–B1"

(SEE DWG. 00108–1E0102)



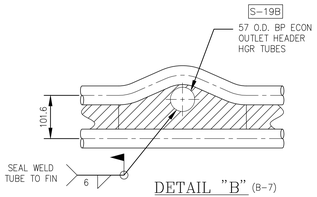
PLAN VIEW "C1–C1"

(SEE DWG. 00108–1E0102)



DETAIL "A" (B–6)

SCALE: 1:5



DETAIL "B" (B–7)

SCALE: 1:5

FOR TENDER PURPOSE ONLY

REFERENCE DWGS:

1. P.P.A.– COMPOSITE SECTIONAL SIDE ---------- 00108–1E0100

REV	DESCRIPTION	DATE	DRAWN BY	CHECKED BY	APPR'D BY
02	REVISED AS NOTED	05JUL10	JDF	CS	PTS
01	REVISED AS NOTED	10JUL09	GMD	CC	PTS
00	ISSUED FOR COORDINATION	02FEB09	JDF	CC	PTS

BHEL CUSTOMER No. : 1700 & 1701

NTPC DRG NO

CUSTOMER: NTPC LIMITED

PROJECT: BARH SUPER THERMAL POWER PROJECT
STAGE–II (2x660MW) - UNIT NO. 4&5
STEAM GENERATOR PACKAGE

BHARAT HEAVY ELECTRICALS LIMITED,
BOILER PLANT UNIT; TIRUCHIRAPALLI–620014

ALL DIMENSIONS IN MILLIMETRE | PROJECTION | SCALE | BHEL DRAWING NO. 0–00–027–44985 | REV. 02

CONTRACT NO. 00108 | UNIT NO. 04 & 05

P.P.A.– PLAN VIEW "B1–B1" & "C1–C1" (SECTS THRU BP)

BARH SUPER THERMAL POWER PROJECT
STAGE–II (2 x 660 MW)

THIS DRAWING IS THE PROPERTY OF ALSTOM Power Inc. WINDSOR, CONNECTICUT 06095

SCALE : 1:40
DRAWN BY : VARMA DATE : 29 OCT 08
CHECKED BY : CC DATE : 02 FEB 09
APPROVED BY : PTS DATE : 02 FEB 09

WBS CODE : 19–88–8100

ALSTOM

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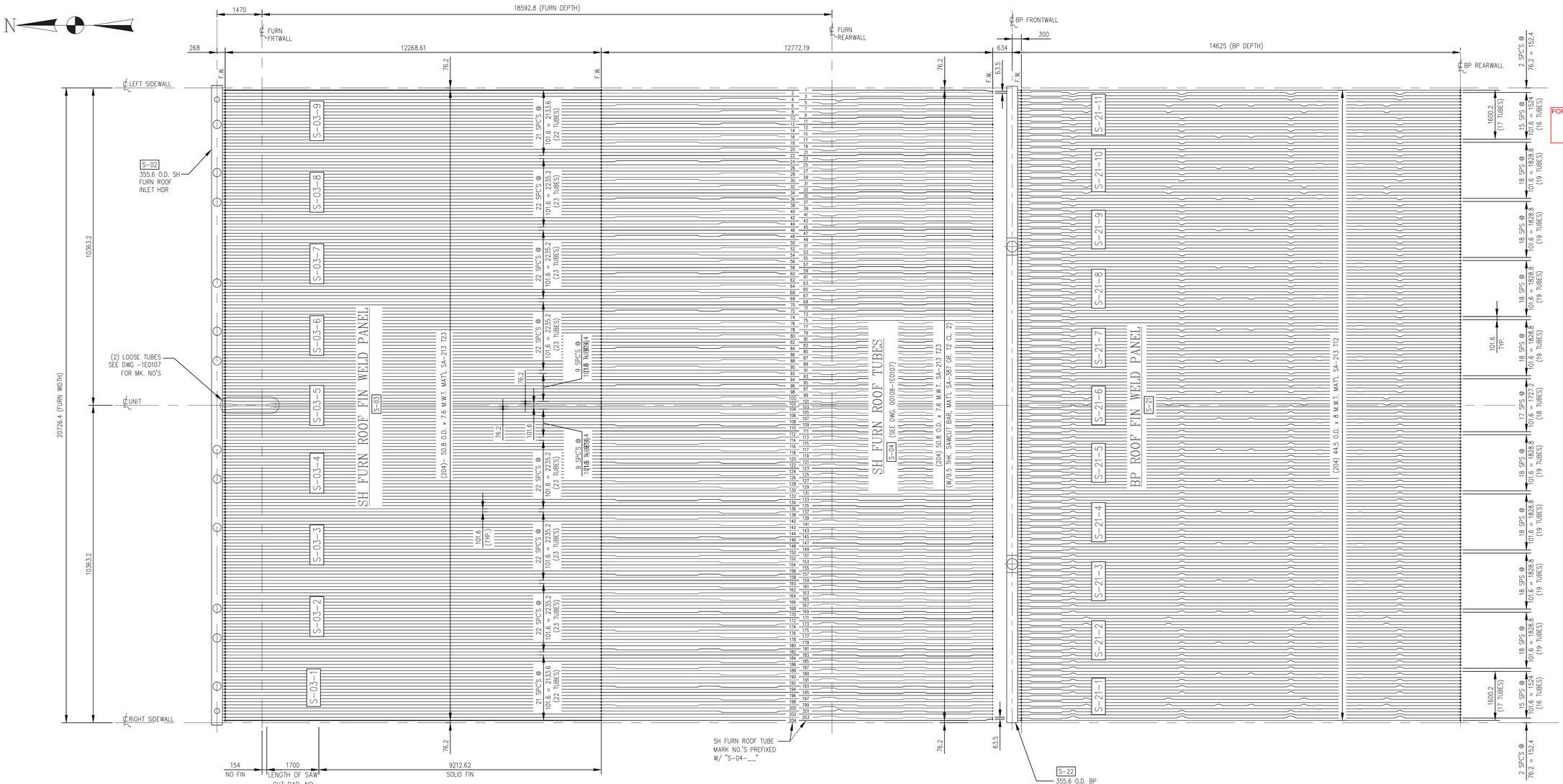
DRAWING NO. 00108–1E0116 | REV. 02 | E

FILE NAME: 00108–1E0116
DIRECTORY: 00108

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E-TENDER ENQUIRY NO.: PSER:PUR:BRH-S434:20 (ENQ:20:PP:0015:PUR:88) Date 05/03/2021.

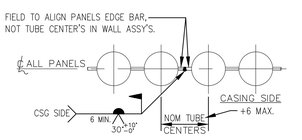
00108–1E0509	REVISION	01	DRW GMD 06/15/09	CHK CC 06/23/09	APP JMH 06/30/09	REVISED GEOMETRY OF S–21 TUBES AT ℄ OF UNIT REVISED FIN ON DETAIL "FX" AND ADDED "#8 TO ERECTOR'S NOTES	02	DRW GMD 10/15/09	CHK CC 10/23/09	APP JMH 10/30/09	REVISED FIN ON DETAIL "FX" AND ADDED #8 TO ERECTOR'S NOTES	03	DRW GMD 28 APR 10	CHK JMH 29 APR 10	APP PTS 30 APR 10	C2– ADDED NOTE #4 AND RENUMBERED NOTES ACCORDINGLY. FURN SIDE WAS CSG SIDE. REVISED PER MARKED PRINTS FROM FIELD OPERATIONS. ADDED DWG ZONE LOCATIONS AT ALL SECT'S & DETL'S. DELETED REFERENCE DRAWING #2.



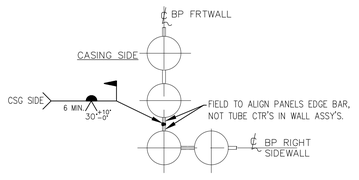
FURNACE ROOF
PLAN VIEW–CASING SIDE

BACKPASS ROOF
PLAN VIEW–CASING SIDE

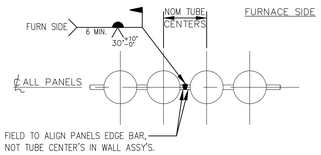
FOR TENDER PURPOSE ONLY



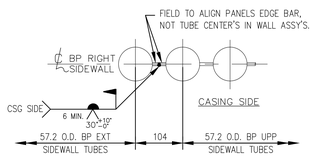
SECTION "Z–Z"
00108–1E0500 (F–6) & (E–1)
(TYP. @ PNL SPLIT)
(AS NOTED)



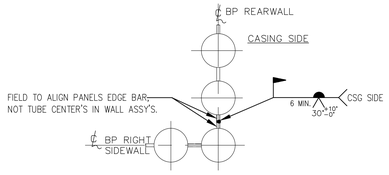
SECTION "X2–X2" (F–6)
(00108–1E0503)



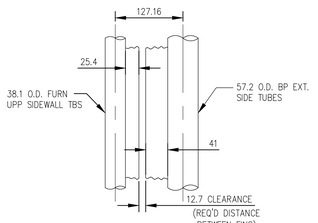
SECTION "W–W"
00108–1E0502 (G–4) & (F–4)
(TYP. @ SPIRAL WALL)
(AS NOTED)



SECTION "X–X" (G–6)
(00108–1E0503)



SECTION "X1–X1" (F–4)
(00108–1E0503)



DETAIL "FX"
(00108–1E0500)

ERECTOR'S NOTES:

1. QUANTITIES SHOWN ARE FOR ONE UNIT.
2. REMOVE & TRIM ERECTION ATTACHMENTS PER ALSTOM STD INSTR SI–20–67. FOR MORE INFO. TO STD INSTR SI–20–67 CONTACT ALSTOM REPRESENTATIVE.
3. ERECTION ATTACHMENTS ON ANY PANEL OR NIPPLE ARE DESIGNED TO CARRY THE WEIGHT OF THE PANEL DIRECTLY BELOW. THEY ARE NOT DESIGNED TO CARRY THE WEIGHT OF MORE THAN ONE PANEL.
4. ALL VOIDS @ F.W. ARE TO BE WELDED GAS TIGHT.
5. ON FIN WELDED PANELS WITHIN THE FURNACE & BACKPASS ENVELOPE TUBE WELDS, PANEL SEAMS, SLOTS AT TUBE BUT WELDS, ERECTION SLOTS, LIFTING SLOTS, ETC..... ARE TO BE WELDED GAS TIGHT PER D–980–0104. ERECTOR TO SUBMIT A WELD PROCEDURE (1) ONE MONTH PRIOR TO WELDING FIN TO FIN, BEFORE THE START OF ERECTION.

   S = SPLIT WEB END
   G.B.R. = GANG BEND RADIUS
   F.W. = FIELD WELD
   S.W. = SHOP WELD
   F.S. = FAR SIDE

   (OT) = ORBITAL TUBE WELD (MANUAL SHOP BUTT WELD IS AN ACCEPTABLE SUBSTITUTION.)

6. ALL FIN BAR IS 6mm THK UNLESS NOTED.
7. 9.5 mm THK. FIN BAR FOR FURN ROOF TUBES, 6 mm THK. FIN BAR FOR BP ROOF TUBES

   FURNACE MAT'L: T12, T22, T23 (SMOOTH) TUBES, USE FIN MAT'L: SA–387 GR. 12 CL. 2. OR GR. 22 CL. 1
   BACKPASS MAT'L: T12 (SMOOTH) TUBES, USE FIN MAT'L: SA–387 GR. 12 CL. 2.

8. FOR SA–213–T23 WELDS THE BELOW NEEDS TO BE FOLLOWED:
   - FOR SA–213–T23 TO –T23 BUTT WELDS 300°F (149°C) PREHEAT IS REQUIRED.
   - FOR SA–213–T23 TO SA–387 GR11, 12, OR 22 FIN OR SCALLOP BAR WELDING 400°F (205°C) PREHEAT IS REQUIRED.
   - WELD FILLER FOR SA–213–T23 TO SA–387 GR11 OR 12 TO BE E7018–B2L.
   - WELD FILLER FOR SA–213–T23 TO SA–387 GR22 TO BE E8018–B3L.

REFERENCE DRAWINGS:

1. PPA – COMPOSITE SECTIONAL SIDE ---------- 00108–1E0100

REV.	DESCRIPTION	DATE	DRAWN BY	CHECKED BY	APPR'D BY
03	REVISED AS NOTED	28APR10	GMD	JMH	PTS
02	REVISED AS NOTED	23OCT09	GMD	CC	PTS
01	REVISED AS NOTED	23JUN09	GMD	CC	PTS
00	ISSUED FOR COORDINATION	27MAR09	JDF	JJK	PTS

BHEL CUSTOMER No.: 1700 & 1701

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NTPC DRG NO

CUSTOMER: NTPC LIMITED

PROJECT: BARH SUPER THERMAL POWER PROJECT
STAGE–II (2x660MW) - UNIT NO. 4&5
STEAM GENERATOR PACKAGE

BHARAT HEAVY ELECTRICALS LIMITED,
BOILER PLANT UNIT; TIRUCHIRAPALLI–620014

305–029

ALL DIMENSIONS IN MILLIMETRE | BHEL DRAWING NO. 0–00–027–45034 | REV. 03

PROJECTION | SCALE

CONTRACT NO. 00108 | UNIT NO. 04 & 05

P.P.A.– PANEL ARRG'T–FURN ROOF & BP ROOF

BARH SUPER THERMAL POWER PROJECT
STAGE–II (2 x 660 MW)

THIS DRAWING IS THE PROPERTY OF ALSTOM Power Inc. WINDSOR, CONNECTICUT 06095

SCALE :
DRAWN BY : A.VIJAY DATE : 22 DEC 08
CHECKED BY : JJK DATE : 25 MAR 09
APPROVED BY : PTS DATE : 27 MAR 09

WBS CODE : 19–88–8150

ALSTOM

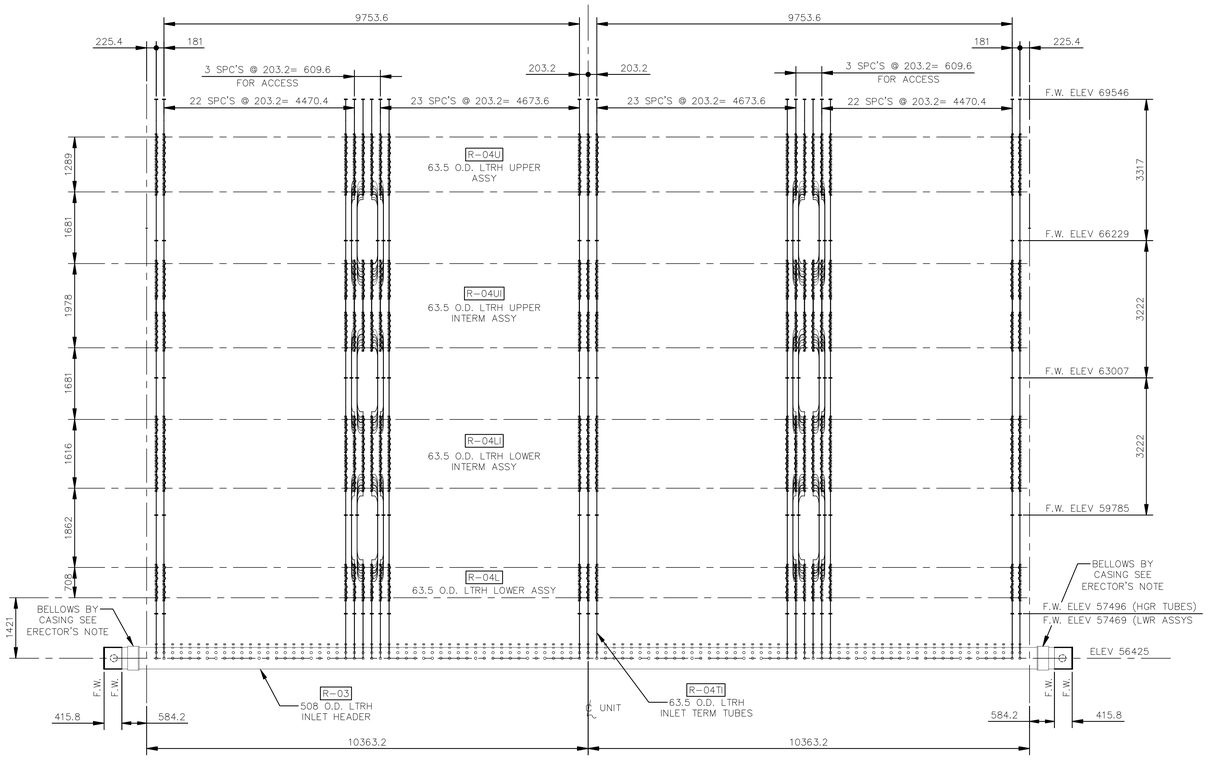
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DRAWING NO. 00108–1E0509 | REV. 03 | E

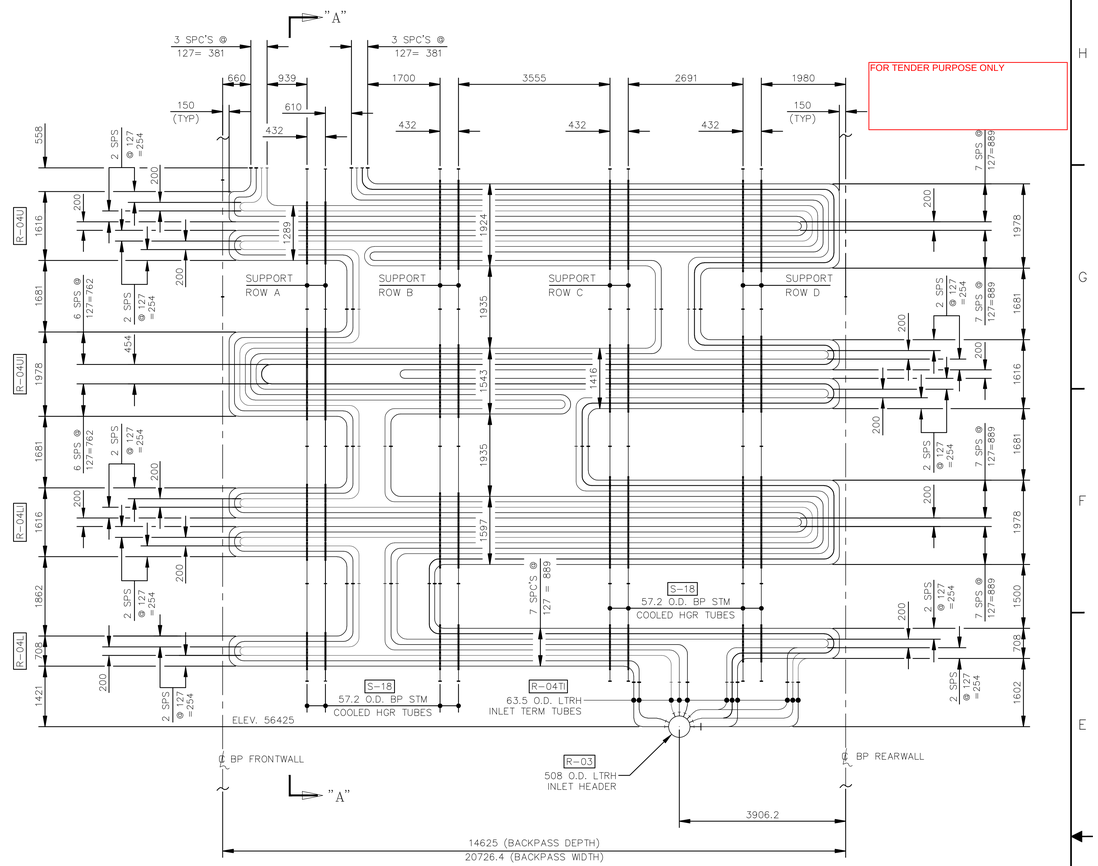
FILE NAME: 00108–1E0509.DWG
DIRECTORY: 00108

E-TENDER ENQUIRY NO.: PSER:PUR:BRH-S434:20 (ENQ:20:PP:0015:PUR:88) Date 05/03/2021.

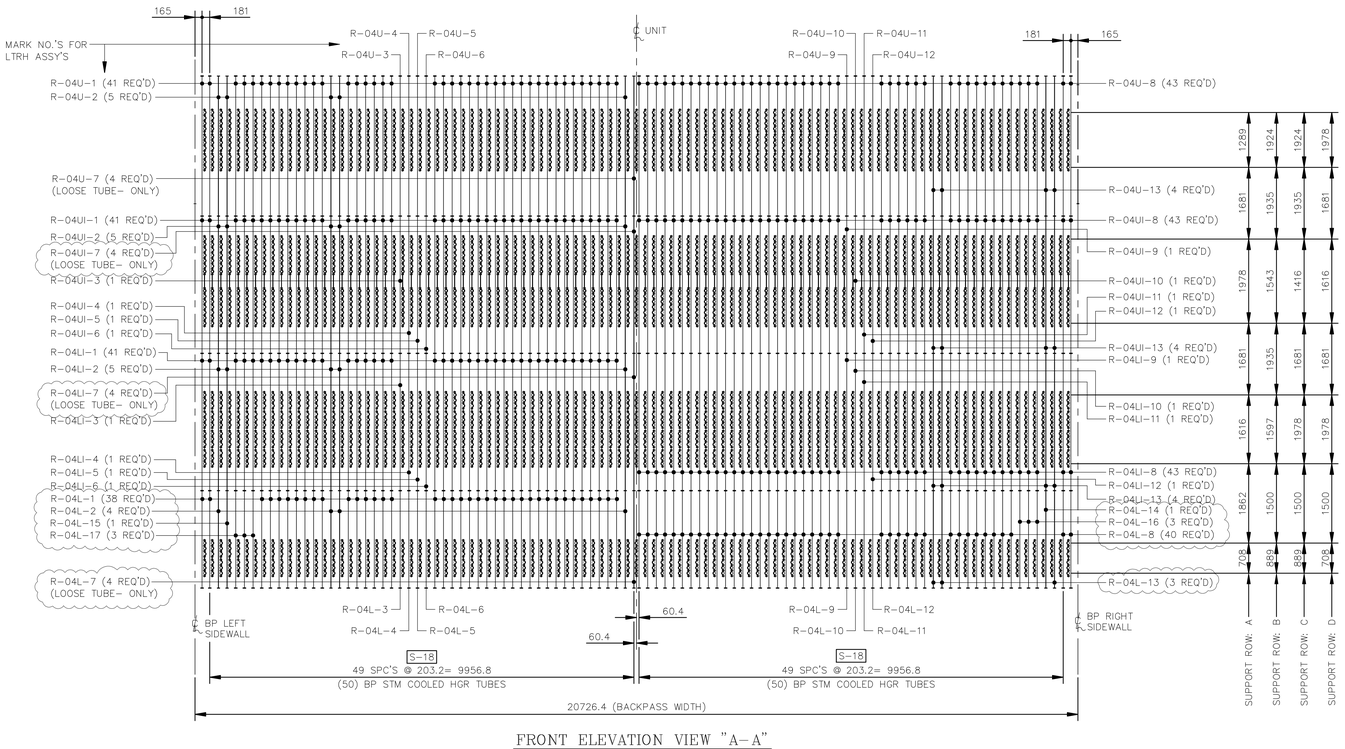
00108-1E0115	REVISION	01	DRWN GMD 27 FEB 10	CHK JMH 27 FEB 10	APP JMH 1 MAR 10	QTY4 WAS QTY 1 ON MK NO.'S R-04UI-7, R-04LI-7, & R-04L-7; ADDED MK NO.'S R04L-14 (1 REQ'D), R-04L-15 (1 REQ'D), R-04L-16 (3 REQ'D), & R-04L-17 (3 REQ'D); QTY 4 WAS QTY 5 ON MK NO. R-04L-2; QTY 38 WAS QTY 41 ON MK NO. R-04L-1; QTY 40 WAS 43 ON MK NO. R-04L-8; ADDED BHEL DWG NO.



FRONT ELEVATION VIEW "E2-E2" (00108-1E0102)
(LOW TEMP REHEATER)
(SCALE 1: 50)



KEY VIEW
(LOW TEMP REHEATER)
(SCALE: 1: 50)



FRONT ELEVATION VIEW "A-A"
(LOW TEMP REHEATER)
(SCALE 1: 50)

REFERENCE DRAWINGS:

1. PPA – COMPOSITE SECTIONAL SIDE_____00108-1E0100
2. PPA – SECTIONAL SIDE ELEV (BACKPASS)_____00108-1E0102

ERECTORS NOTE:

ERECTOR TO INSTALL BELLOWS AT HEADER PRIOR TO WELDING. WELD BELLOWS TO HEADER AFTER BELLOWS HAS BEEN WELDED TO CASING.

REV	DESCRIPTION	DATE	DRAWN BY	CHECKED BY	APPR'D BY
01	REVISED AS NOTED	27FEB10	GMD	JMH	PTS
00	ISSUED FOR COORDINATION	30JUL09	GMD	CDS	PTS

BHEL CUSTOMER No.: 1700 & 1701

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NTPC DRG NO

CUSTOMER: NTPC LIMITED

PROJECT: **BARH SUPER THERMAL POWER PROJECT**
STAGE-II (2x660MW) - UNIT NO. 4&5
STEAM GENERATOR PACKAGE

BHARAT HEAVY ELECTRICALS LIMITED,
BOILER PLANT UNIT; TIRUCHIRAPALLI-620014

355-029

ALL DIMENSIONS IN MILLIMETRE | PROJECTION | SCALE 1: 50 | BHEL DRAWING NO. 0-00-027-45040 | REV. 01

CONTRACT NO. 00108 | UNIT NO. 04 & 05

P.P.A. FRONT ELEVATION VIEW "E2-E2" (LTRH ASSY'S)

BARH SUPER THERMAL POWER PROJECT
STAGE-II (2 x 660 MW)

THIS DRAWING IS THE PROPERTY OF ALSTOM Power Inc. WINDSOR, CONNECTICUT 06095

SCALE : 1: 50
DRAWN BY : G. D'ANDREA DATE : 31 MAR 09
CHECKED BY : C.SRIRAM DATE : 07 AUG 09
APPROVED BY : PTS DATE : 07 AUG 09

WBS CODE : 19-88-8100

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DRAWING NO. 00108-1E0115 | REV. 01 | E

FILE NAME: 00108-1E0115
DIRECTORY: 00108

E-TENDER ENQUIRY NO.: PSER:PUR:BRH-S434:20 (ENQ:20:PP:0015:PUR:88) Date 05/03/2021.

00108–1E0100	REVISION	05	D JDF RR W 24 JUN 10	C CDS KK K 25 JUN 10	A PTS PP P 26 JUN 10	c2 – REVISED PER MARKED PRINTS FROM FIELD OPERATIONS	06	D FARHA RR W 14 JUN 17	C DIPTENDU KK K 14 JUN 17	A A.C. PP P 14 JUN 17	c4– ADDITIONAL ECON. & LTRH SURFACES ADDED. AS PER NEW GA INPUTS.	07	D TGK RR W 08 JUL 17	C DIPTENDU KK K 08 JUL 17	A A.C. PP P 08 JUL 17	NEW F.W. MARKING RELOCATED FOR S–18 HGR AND R–04U–NEW MAIN & ACCESS ASSEMBLY, E–06U–NEW ASSEMBLY ADDED, E–07O CIRCUIT DELETED.	08	D AR RR W 20 APR 18	C KSG KK K 20 APR 18	A MA PP P 20 APR 18	E–06U NEW CIRCUIT MODIFIED AS NOTED.	09	D M.U RR W 21 AUG 18	C SVM KK K 21 AUG 18	A MA PP P 21 AUG 18	F.W. FOR R–07–NEW INCLUDED AS PER CUSTOMER COMMENTS

ERECTOR'S NOTES:

1. FIELD FABRICATION AND/OR WELDING SHALL COMPLY TO A.S.M.E. CODE SECTION I & IBR.
2. QUANTITIES SHOWN ARE FOR (1) ONE UNIT. (2) TWO UNITS PER CONTRACT.
3. ALL DIMENSIONS INDICATED ARE IN MILLIMETERS UNLESS OTHERWISE SPECIFIED.
4. ALL CIRCUIT NUMBERS ARE TO BE PAINTED ON COMPONENTS FOR FIELD IDENTIFICATION AS SHOWN. (F–01, ETC.....).
5. WP= WORKPOINT
   FW= FIELD WELD
   SW= SHOP WELD
   NS= NEAR SIDE
   FS= FAR SIDE
   FWA= FIELD WELDED ATACHMENTS
6. ERECTOR SHALL FURNISH FOR OMEGA LUGS THE FOLLOWING:
   a) THREADED RODS 1" DIA, SA–675 GR 70 H.R. LENGTH AS REQUIRED.
   b) NUTS & WASHERS FOR ITEM (a).
7. OMEGA LUGS HAVE BEEN LOCATED WHERE THERE IS SUFFICIENT STRENGTH. THE ERECTOR IS NOT TO ADD OMEGA LUGS INDISCRIMINATELY.
8. OMEGA LUGS ARE NOT TO BE USED AS LIFTING DEVICES.
9. OMEGA LUGS FOR SH & RH HORIZONTAL SURFACES ARE SIZED TO CARRY THE WEIGHT OF ALL SUPERHEATER AND REHEATER ASSEMBLIES DIRECTLY BELOW THEM.
10. ERECTION ATTACHMENTS ON ANY PANEL ARE DESIGNED TO SUPPORT ONLY THE WEIGHT OF THE PANEL DIRECTLY BELOW. THEY ARE NOT DESIGNED TO SUPPORT THE WEIGHT OF MORE THAN ONE PANEL.
11. REMOVE & TRIM ERECTION ATTACHMENTS PER ALSTOM STD INSTR SI–20–67. FOR MORE INFO TO APPLICATION OF ERECTION ATTACHMENTS CONTACT ALSTOM ERECTION REPRESENTATIVES.
12. PANEL ERECTION ATTACHMENTS ARE NOT TO BE USED AS LIFTING DEVICES.
13. ERECTOR SHALL FURNISH FOR PANEL ERECTION ATTACHMENTS THE FOLLOWING:
    a) TIE RODS .875" DIA, THREADED AT BOTH ENDS (3" LG THREAD LGTH) W/ .875"–9 UNC–2A, MATERIAL A–307, GR A.
    b) .875"–9 UNC–2B HEAVY HEX NUT, MATERIAL A–307, GR A.

CIRC NO.	DESCRIPTION OF HEATING SURFACES, HEADERS & LINKS	WBS NO.	PCMA NO.
E–02	457.2 O.D. ECON INLET SPOOL	10030005	19–850
E–04	457.2 O.D. ECON INLET LINK	10030010	19–850
E–04A	457.2 O.D. ECON INLET LINK	10030010	19–850
E–04B	457.2 O.D. ECON INLET LINK	10030010	19–850
E–05	457.2 O.D. ECON INLET HEADER	10010010	19–701
E–06(T)	44.5 O.D. ECON INLET TERM TUBES	10150003	19–824
E–06L	44.5 O.D. ECON LWR PLAIN TUBE ASSY	10022501	19–824
E–06I	44.5 O.D. ECON INTERM PLAIN TUBE ASSY	10022301	19–824
E–06U	44.5 O.D. ECON UPP PLAIN TUBE ASSY	10022101	19–814
E–06U(NEW)	44.5 O.D. ECON UPP PLAIN TUBE ASSY NEW	10022101	19–814
E–06T0 E–06T1	44.5 O.D. ECON OUTLET TERM TUBES	10150004	19–814
E–09	508 O.D. ECON OUTLET HEADER	10010020	19–702
EF–01	508 O.D. ECON OUTLET LINK	10030020	19–851
EF–02	609.6 O.D. ECON MIXING LINE	10030032	19–852
EF–03	406.4 O.D. ECON WATERWALL INLET LINK	10030033	19–850
F–01	406.4 O.D. FURN LWR FRONT INLET HEADER	13012010	05–137
F–02(T)	41.3 O.D. FURN LWR FRONT SPIRAL TERM TUBES	13152034	06–737
F–02L	41.3 O.D. FURN LWR FRT SPIRAL FW PANEL	13122034	06–737
F–02U	41.3 O.D. FURN UPP FRT SPIRAL FW PANEL	13121934	06–734
F–02F	FURN SPIRAL WALL FITTINGS	13170434	06–734
F–02T0	38.1 O.D. FURN UPP FRONT SPIRAL TERM TUBES	13151934	06–734
F–03	355.6 O.D. FURN INTERM FRONT HEADER	13011831	05–331
F–04T1	38.1 O.D. FURN FRONT VERT TERM TUBES	13152200	07–232
F–04F	FURN VERT WALL FITTINGS	13170200	06–734
F–04U	38.1 O.D. FURN UPP INT FRONT FIN WLD PANEL	13121700	06–731
F–04U	38.1 O.D. FURN UPP FRONT FIN WLD PANEL	13121600	06–731
F–05	323.9 O.D. FURN UPP FRONT OUTLET HEADER	13011620	05–231
F–06	219.1 O.D. FURN FRONT RISERS	13051531	07–218
F–07	406.4 O.D. FURN LWR REAR INLET HEADER	13012610	05–147
F–08(T)	41.3 O.D. FURN LWR REAR SPIRAL TERM TUBES	13152634	06–747
F–08L	41.3 O.D. FURN LWR REAR SPIRAL FW PANEL	13122634	06–747
F–08U	41.3 O.D. FURN UPP REAR SPIRAL FW PANEL	13122534	06–744
F–08F	FURN SPIRAL WALL FITTINGS	13170434	06–734
F–09T0	38.1 O.D. FURN UPP REAR SPIRAL TERM TUBES	13152534	06–744
F–09	355.6 O.D. FURN INTERM REAR HEADER	13012431	05–327
F–10(T)	38.1 O.D. FURN UPP REAR VERT TERM TUBES	13152200	06–741
F–10F	FURN VERT WALL FITTINGS	13170200	06–734
F–11	38.1 O.D. FURN REAR ARCH FIN WLD PANEL	13120700	06–741
F–12	38.1 O.D. FURN REAR SCREEN TUBES	13152120	07–223
F–13	57.2 O.D. FURN REAR HANGER TUBES	13152102	07–225
F–14	323.9 O.D. FURN UPP REAR OUTLET HEADER	13012220	05–227
F–15	219.1 O.D. FURN REAR RISERS	13052131	07–216
F–16	406.4 O.D. FURN LWR SIDE INLET HEADER	13012210	05–155
F–17L	41.3 O.D. FURN LWR SIDE SPIRAL FW PANEL	13122334	06–755
F–17U	41.3 O.D. FURN UPP SIDE SPIRAL FW PANEL	13123134	06–753
F–17F	FURN SPIRAL WALL FITTINGS	13170434	06–734
F–17T0	38.1 O.D. FURN UPP SIDE SPIRAL TERM TUBES	13153134	06–753
F–18	355.6 O.D. FURN INTERM SIDE HEADER	13013031	05–351
F–19(T)	38.1 O.D. FURN UPP SIDE VERT TERM TUBES	13152800	07–231
F–19F	FURN VERT WALL FITTINGS	13170200	06–734
F–19U	38.1 O.D. FURN UPP INT SIDE FIN WLD PANEL	13122900	06–751
F–19U	38.1 O.D. FURN UPP SIDE FIN WLD PANEL	13122800	06–751
F–20	323.9 O.D. FURN UPP SIDE OUTLET HEADER	13012820	05–251
F–21	219.1 O.D. FURN SIDE RISERS	13052731	07–215
F–31	558.8 O.D. SEPARATOR	13067000	04–321
F–32	355.6 O.D. FURN LINK TO STORAGE TANK	13039051	07–102
F–33	660.4 O.D. SEPARATOR STORAGE TANK	13260100	04–323
F–34	88.9 O.D. FURN STORAGE TANK VENT LINK	13039351	07–215
F–49	355.6 O.D. FURN DOWNCOMER TO CONN SPHERE	13039076	07–102
F–50	914.4 O.D. FURN CONNECTING SPHERE	13067600	07–108
F–51	558.8 O.D. WATER STORAGE DOWNCOMER	13039851	24–805
F–52	558.8 O.D. LINK TO BLR RECIRC SYS	13039853	24–805
F–53	558.8 O.D. LINK TO BLR RECIRC ISOL VALVE	13039855	24–805
F–56	558.8 O.D. LINK TO BLR RECIRC MIXING SPHERE	13039883	24–805
F–57	BLR RECIRC MIXING SPHERE	13039083	24–806
F–59A	508 O.D. CIRC PUMP SUCTION SPOOL	13039801	24–807
F–59B	508 O.D. CIRC PUMP SUCTION LINE	13039852	24–807
F–59C	508 O.D. CIRC PUMP SUCTION LINE	13039852	24–807
F–60	RECIRCULATION PUMP	13420400	24–855
F–61A	355.6 O.D. LINK TO BLR RECIRC CTRL VALVE	13039861	24–808
F–61B	355.6 O.D. BLR RECIRC LINK TO ECON	13039861	24–808
F–61C	355.6 O.D. BLR RECIRC LINK TO ECON	13039862	24–808
F–66A	323.9 O.D. START–UP FEEDWATER LINE	13039866	24–809
F–66B	323.9 O.D. S.U. FEEDWATER LINE TO MIXING SPHERE	13039868	24–809
F–67A	508 O.D. FURN LINK TO FLASH TANK	13039888	24–805
F–67B	406.4 O.D. FURN LINK TO HML1 VALVE	13039891	24–805
F–67C	406.4 O.D. FURN LINK TO HML2 VALVE	13039892	24–805
F–GFA	FURN SOFA FIN WLD PANEL	13120115	06–500
F–WB	FURN WINDBOX PANELS	13120010	06–400
R–03	508 O.D. LTRH INLET HEADER	16010210	15–136
R–04T	63.5 O.D. LTRH INLET TERM TUBES	16150203	16–238
R–04L	63.5 O.D. LTRH LOWER ASSY	16020200	16–238
R–04U	63.5 O.D. LTRH LOWER INTERM ASSY	16020300	16–237
R–04U	63.5 O.D. LTRH UPPER INTERM ASSY	16020500	16–237
R–04U	63.5 O.D. LTRH UPPER ASSY	16020600	16–235
R–04U(NEW)	63.5 O.D. LTRH UPPER ASSY NEW	16020600	16–235
R–04U(NEW)	63.5 O.D. LTRH PENDANT ASSY NEW	16020880	17–776
R–07	63.5 O.D. LTRH PENDANT ASSY	16020880	17–776
R–07O	63.5 O.D. LTRH OUTLET TERM TUBES	16150604	17–776
R–08	660.4 O.D. LTRH OUTLET HEADER	16010620	15–236
R–09	711.2 O.D. LEAD TO RH DESUPERHEATER	16038810	17–174
R–10	711.2 O.D. RH DESUPERHEATER	16030050	24–316
R–11	711.2 O.D. LINK TO FINISH RH	16032210	17–174
R–12	609.6 O.D. FINISH RH INLET HEADER	16012210	15–177
R–13T	FINISH RH INLET TERM TUBES	16152203	16–279
R–13	63.5 O.D. FINISHING RH ASSY	16022000	16–279
R–13T0	FINISH RH OUTLET TERM TUBES	16152604	16–279
R–14	762 O.D. RH OUTLET HEADER	16010020	15–279
S–01	273.05 O.D. SH CONNECTING PIPE	15050563	12–850
S–02	355.6 O.D. SH FURN ROOF INLET HEADER	14011110	10–191
S–03	50.8 O.D. SH FURN ROOF FIN WLD PANEL	14121100	11–791
S–04	50.8 O.D. SH FURN ROOF TUBES	14151100	11–991
S–05	609.6 O.D. SH FURN ROOF OUTLET HEADER	14011120	10–291
S–06	406.4 O.D. BP EXT SIDE INLET HEADER	14015710	10–184
S–07	57 O.D. BP EXT SIDE FIN WLD PANEL	14125700	11–684
S–08	57 O.D. BP EXT SIDE FLOOR FW PANEL	14126300	11–694
S–08T0	57 O.D. BP EXT SIDE OUT TERM TUBES	14155704	11–694
S–09	508 O.D. BP EXT SIDE FLOOR OUT HEADER	14016320	10–284
S–09	38.1 O.D. EQUALIZING LINE	14016320	10–284
S–09A	355.6 O.D. SC FURN ARCH SUPT INL HEADER	14040717	10–135
S–09B	168.3 O.D. SC FURN ARCH SUPT LINKS	14039507	12–184
S–09C	355.6 O.D. SC FURN ARCH SUPT OUT HEADER	14010727	10–235
S–10	406.4 O.D. BP EXT SIDE CONN LINK	14035763	12–184
S–11	406.4 O.D. BP UPP SIDE INLET HEADER	14012800	10–183
S–12U	57.2 O.D. BP UPP SIDE FIN WLD PANEL	14122800	11–787 11–788 11–789 11–960
S–12L	57.2 O.D. BP LWR SIDE FIN WLD PANEL	14123200	11–787 11–788 11–789 11–960
S–13	355.6 O.D. BP LWR SIDE HEADER	14013200	10–283
S–14	355.6 O.D. BP LWR FRONT HEADER	14012000	10–185
S–15	50.8 O.D. BP FRONT SCREEN TUBES	14151520	12–805
S–17	355.6 O.D. BP LWR REAR HEADER	14012600	10–182
S–18	57 O.D. BP STM COOLED HGR TUBES	14150017	12–515
S–18T0	57 O.D. BP STM COOLED HGR TERM TUBES	14150017	12–515
S–19A	57 O.D. BP LTRH INL HEADER HGR TUBES	14158622	12–515
S–19AT0	57 O.D. BP LTRH INL HEADER TERM TUBES	14158623	16–238
S–19B	57 O.D. BP ECON OUTLET HEADER HGR TUBES	14151307	12–515
S–19BT0	57 O.D. BP ECON OUT HDR HGR TERM TUBES	14158128	12–515
S–20U	44.5 O.D. BP UPR REAR FIN WLD PANEL	14122200	11–716 11–916 11–917 11–918
S–20L	44.5 O.D. BP LWR REAR FIN WLD PANEL	14122600	11–787 11–788 11–789 11–987
S–21	44.5 O.D. BP ROOF FIN WLD PANEL	14120900	11–787 11–788 11–789 11–987
S–22	355.6 O.D. BP FRONT OUTLET HEADER	14011520	10–285
S–24	273 O.D. BP BYPASS PIPE	14050037	12–187
S–25	457.2 O.D. LINK TROM BP SC SUPT OUT HDR	15034210	12–852
S–25A	406.4 O.D. LINK FROM BP FRONT OUT HEADER	14033327	12–852
S–25B	406.4 O.D. LINK FROM BP FRONT OUT HEADER	14033520	12–852
S–26	406.4 O.D. BP STM COOL SUPT OUT HEADER	14010327	10–687
S–32	355.6 O.D. SH PLATEN INLET HEADER	15014210	10–178
S–33T1	SH PLATEN INLET TERM TUBES	15154203	11–078 11–079
S–33	44.5 O.D. SH PLATEN ASSY	15024200	11–078 11–079
S–33T0	SH PLATEN OUTLET TERM TUBES	15154204	11–078 11–378
S–34	406.4 O.D. SH PLATEN OUTLET HEADER	15014220	10–278
S–35	558.8 O.D. LINK TO SH DESUPERHEATER	15039810	12–178
S–36	558.8 O.D. SH DESUPERHEATER	15030050	12–900
S–37	558.8 O.D. LINK TO FINISH SH	15032210	12–178
S–38	457.2 O.D. FINISH SH INLET HEADER	15012210	10–174
S–39T1	FINISH SH INLET TERM TUBES	15152203	11–074
S–39	44.5 O.D. FINISHING SH FRONT ASSY	15022700	11–074
S–39T0	44.5 O.D. SH FIN CROSSOVER TUBES	15152261	11–074
S–40	44.5 O.D. FINISHING SH REAR ASSY	15022800	11–374
S–40T0	FINISH SH OUTLET TERM TUBES	15152604	11–374
S–41	609.6 O.D. SH OUTLET HEADER	15010020	10–274
S–44	SH FLUID COOLED SPACER TUBES	15156050	12–803 12–807

REFERENCE DRAWINGS:

1.	P.P.A.– SECTIONAL SIDE ELEVATION (UPPER FURNACE)	00108–1E0101
2.	P.P.A.– SECTIONAL SIDE ELEVATION (BACKPASS)	00108–1E0102
3.	P.P.A.– SECTIONAL SIDE ELEVATION (LOWER FURNACE)	00108–1E0103
4.	P.P.A.– FRONT ELEV VIEW "E1–E1" (ECONOMIZER)	00108–1E0104
5.	P.P.A.– PLAN VIEW "A–A" HDRS & LINKS (FURN)	00108–1E0105
6.	P.P.A.– PLAN VIEW "A1–A1" HDRS & LINKS (BP)	00108–1E0106
7.	P.P.A.– PLAN VIEW "B–B" ROOF TUBES (FURN)	00108–1E0107
8.	P.P.A.– PLAN VIEW "C–C" (SECT THRU FURNACE)	00108–1E0108
9.	P.P.A.– PLAN VIEW "D–D" (FURN REAR ARCH TUBES)	00108–1E0109
10.	P.P.A.– FLUID COOLED SPCR'S (SHT 1 OF 4)	00108–1E0110
11.	P.P.A.– FLUID COOLED SPCR'S (SHT 2 OF 4)	00108–1E0111
12.	P.P.A.– FLUID COOLED SPCR'S (SHT 3 OF 4)	00108–1E0112
13.	P.P.A.– ELEV VIEW "R–R" (LWR FURN)	00108–1E0113
14.	P.P.A.– PLAN VIEW "S–S"	00108–1E0114
15.	P.P.A.– FRONT ELEV VIEW "E1–E1" (ECONOMIZER)	00108–1E0115
16.	P.P.A.– PLAN VIEW "B1–B1" & "C1–C1" (SECTS THRU BP)	00108–1E0116
17.	P.P.A.– SIDE ELEV VIEW RH INLET & OUTLET HDRS	00108–1E0117
18.	P.P.A.– FRONT ELEV VIEW RH INLET & OUTLET HDRS	00108–1E0118
19.	P.P.A.– SIDE ELEV VIEW SH PLATEN INLET & OUTLET HDRS	00108–1E0119
20.	P.P.A.– FRONT ELEV VIEW SH PLAT INLET & OUTLET HDRS	00108–1E0120
21.	P.P.A.– SECT "SP–SP" SEPARATOR PIPING ARRANGEMENT	00108–1E0121
22.	P.P.A.– FURN UPP TM OUT'L HDR & FURN RF INL HDR ARRG'T	00108–1E0122
23.	P.P.A.– FURN UPP SIDEWALL HEADER ARRANGEMENT	00108–1E0123
24.	P.P.A.– ECON MIXING LINE ARRANGEMENT	00108–1E0124
25.	P.P.A.– PLAN VIEW "E–E" (BP RING HDR)	00108–1E0125
26.	P.P.A.– FRONT ELEV VIEW LTRH OUTLET HDR	00108–1E0126
27.	P.P.A.– ARRG'T AT BP STM COOL SUPT OUT HEADER	00108–1E0127
28.	P.P.A.– (OPEN)	00108–1E0128
29.	P.P.A.– (OPEN)	00108–1E0129
30.	P.P.A.– (OPEN)	00108–1E0130
31.	P.P.A.– PLAN VIEW "F–F" (ECON OUT HDR & LTRH INL HDR)	00108–1E0131
32.	P.P.A.– PLAN VIEW "E1–E1"	00108–1E0132
33.	P.P.A.– BP EXT SIDE OUT TERM TUBES MK NO. ARRG'T	00108–1E0133
34.	P.P.A.– FLUID COOLED SPCR'S (SHT 4 OF 4)	00108–1E0134
35.	P.P.A.– SPIRAL/VERTICAL TRANSITION AT SIDEWALL	00108–1E0135
36.	P.P.A.– SPIRAL/VERTICAL TRANSITION AT FRT & REAR WALL	00108–1E0136
37.	P.P.A.– PLAN VIEW "D1–D1" (EXT SIDE FLOOR TUBES)	00108–1E0137
38.	P.P.A.– SIDE ELEV VIEW SH FINISH INLET & OUTLET HDRS	00108–1E0138
39.	P.P.A.– FRONT ELEV VIEW SH FINISH INLET & OUTLET HDRS	00108–1E0139
40.	P.P.A.– LTRH INLET HDR SUPPORT TUBES	00108–1E0140
41.	P.P.A.– LTRH INLET HDR SUPPORT TUBES	00108–1E0141
42.	P.P.A.– ECON OUTLET HDR SUPPORT TUBES	00108–1E0142
43.	P.P.A.– ECON OUTLET HDR SUPPORT TUBES	00108–1E0143
44.	P.P.A.– SC FURN ARCH SUPPORT ARRG'T	00108–1E0144
45.	P.P.A.– ARRG'T OF 46° WINDBOX TUBE PANEL	00108–1E0145
46.	P.P.A.– ARRG'T OF 38° WINDBOX TUBE PANEL	00108–1E0146
47.	P.P.A.– ARRG'T OF SOFA TUBE PANEL	00108–1E0147
48.	P.P.A.– SOFA TUBE PANEL (SECT'S & DET'LS)	00108–1E0148
49.	P.P.A.– ARRG'T OF 46° WINDBOX TUBE PANEL	00108–1E0149
50.	P.P.A.– ARRG'T OF 38° WINDBOX TUBE PANEL	00108–1E0150
51.	P.P.A.– WINDBOX TUBE PANEL (SECTS & DET'LS)	00108–1E0151
52.	P.P.A.– (OPEN)	00108–1E0152
53.	P.P.A.– FIELD WLD ATTM'S– SUPERHEATERS	00108–1E0153
54.	P.P.A.– FIELD WLD ATTM'S– SH & RHLT PEND	00108–1E0154
55.	P.P.A.– FIELD WLD ATTM'S– DETAILS (RH)	00108–1E0155
56.	P.P.A.– BOILER PRESSURE PARTS ARRG'T SECTIONAL SIDE ELEV	00108–1E0160
57.	P.P.A.– PRESSURE PART SCHEDULE	00108–1E0161
58.	P.P.A.– SECTIONAL SIDE ELEV (UPPER FURNACE)	00108–1E0162
59.	P.P.A.– SECTIONAL SIDE ELEVATION (BACKPASS)	00108–1E0163
60.	P.P.A.– SECTIONAL SIDE ELEV (LOWER FURNACE)	00108–1E0164
61.	P.P.A.– PLAN VIEW "A–A" HEADERS & LINKS (FURNACE)	00108–1E0165
62.	P.P.A.– PLAN VIEW "A1–A1" HEADERS & LINKS (BACKPASS)	00108–1E0166
63.	P.P.A.– PLAN VIEW "C–C" SECTIONS THROUGH FURNACE	00108–1E0167
64.	P.P.A.– PLAN VIEW "S–S" (LOWER FURNACE)	00108–1E0168
65.	P.P.A.– PLAN VIEW "B1–B1"&"C1–C1" (SECTIONS THROUGH BACKPASS)	00108–1E0169
66.	P.P.A.– BOILER PRESSURE PARTS ARRANGEMENT	00108–1E0170
67.	P.P.A.– PRESSURE PART SCHEDULE	00108–1E0171
68.	P.P.A.– PPA FRONT ELEVATION OF FURNACE LOOKING SOUTH	00108–1E0175
69.	P.P.A.– SECTION REAR ELEVATION OF FURNACE	00108–1E0176
70.	P.P.A.– PANEL ARRANGEMENT FURN VERTICAL WALLS	00108–1E0500
71.	P.P.A.– PANEL ARRG'T SPIRAL FURN– RIGHT SIDEWALL	00108–1E0501
72.	P.P.A.– PANEL ARRG'T SPIRAL FURN– LEFT SIDEWALL	00108–1E0502
73.	P.P.A.– PANEL ARRANGEMENT– BACKPASS	00108–1E0503
74.	P.P.A.– PANEL ARRG'T SPIRAL FURN– FRONT WALL	00108–1E0504
75.	P.P.A.– PANEL ARRG'T SPIRAL FURN– REAR WALL	00108–1E0505
76.	P.P.A.– PANEL ARRG'T– RIGHT HOPPER SIDEWALL	00108–1E0506
77.	P.P.A.– PANEL ARRG'T– LEFT HOPPER SIDEWALL	00108–1E0507
78.	P.P.A.– PANEL ARRG'T– FRT & REAR HOPPER WALL	00108–1E0508
79.	P.P.A.– PANEL ARRG'T– FURN ROOF & BP ROOF	00108–1E0509
80.	P.P.A.– FIELD WELDED ATTACHMENTS – BACKPASS	00108–1E0510
81.	P.P.A.– FURN UPP SPIRAL RIGHT & LEFT SIDEWALL STRAP ARRG'T	00108–1E0520
82.	P.P.A.– FURN LWR SPIRAL RIGHT & LEFT SIDEWALL STRAP ARRG'T	00108–1E0521
83.	P.P.A.– FURN UPP SPIRAL FRONTWALL & REARWALL STRAP ARRG'T	00108–1E0522
84.	P.P.A.– FURN LWR SPIRAL FRONTWALL & REARWALL STRAP ARRG'T	00108–1E0523
85.	P.P.A.– TENSION BAR ASSY W/ DETAILS	00108–1E0524
86.	P.P.A.– TENSION BAR SECTIONS & DETAILS	00108–1E0525
87.	P.P.A.– FIELD WELDED LOWER SPIRAL LUG SECTIONS AND DETAILS	00108–1E0526
88.	P.P.A.– FIELD WELDED LOWER SPIRAL LUG ASSEMBLY	00108–1E0527
89.	P.P.A.– FIELD WELDED WINDBOX CORNER ASSEMBLY	00108–1E0528
90.	P.P.A.– FIELD WELDED FRONT AND REAR WALL LUG ASSEMBLY	00108–1E0529
91.	P.P.A.– FIELD WELDED LUG DETAILS	00108–1E0530
92.	P.P.A.– FIELD WELDED LUG & ASSEMBLY ATTACHMENTS	00108–1E0531
93.	P.P.A.– FIELD WELDED ATTACHMENTS	00108–1E0532
94.	FIELD WELDING OF FUSION WELDED PANELS	D–980–0104
95.	CABLE OPENING @ ROOF & PIPE CAP DETAILS	00108–1D0535
96.	DETAIL & DATA FOR SETTINGS	00108–1D3301
97.	REMOVAL OF BLANKING PLATE TILTING TANG. & FIXED BURNERS	A–991–423

FOR TENDER PURPOSE ONLY

SECTIONAL SIDE ELEVATION

REV	DESCRIPTION	DATE	DRAWN BY	CHECKED BY	APPR'D BY
09	REVISED AS NOTED	21AUG18	M.U	SVM	MA
08	REVISED AS NOTED	19APR18	AR	KSG	MA
07	REVISED AS NOTED	08JUL17	TGK	DIPTENDU	A.C.
06	REVISED AS NOTED	14JUN17	FARHA	DIPTENDU	A.C.

BHEL CUSTOMER No.: 1700 & 1701

NTPC DRG NO

CUSTOMER: NTPC LIMITED

PROJECT: BARH SUPER THERMAL POWER PROJECT
STAGE–II (2x660MW) - UNIT NO. 4&5
STEAM GENERATOR PACKAGE

BHARAT HEAVY ELECTRICALS LIMITED,
BOILER PLANT UNIT; TIRUCHIRAPALLI–620014

305–029
ALL DIMENSIONS IN MILLIMETRE
PROJECTION SCALE
BHEL DRAWING NO. 0–00–027–44970 REV. 09

CONTRACT NO. 00108 UNIT NO. 04 & 05

PPA– COMPOSITE SECTIONAL SIDE

BARH SUPER THERMAL POWER PROJECT
STAGE–II (2 x 660 MW)

THIS DRAWING IS THE PROPERTY OF ALSTOM Power Inc. WINDSOR, CONNECTICUT 06095

SCALE : 1: 100
DRAWN BY : C.SIRANI DATE : 02 APR 08
CHECKED BY : JAK DATE : 19 AUG 08
APPROVED BY : P.T.S. DATE : 19 AUG 08

WBS CODE : 19–88–8100

DRAWING NO. 00108–1E0100 REV. 09 E

ALSTOM

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FILE NAME: 00108–1E0100
DIRECTORY: 00108

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E-TENDER ENQUIRY NO.: PSER:PUR:BRH-S434:20 (ENQ:20:PP:0015:PUR:88) Date 05/03/2021.

00108-1E0101	REVISION			
	07	DRW GMD 30 JAN 10	CHK JMH 01 FEB 10	APP PTS 04 FEB 10	MOVED HANGER ROWS C & D AND UPDATED DIMENSIONS TO REFLECT LATEST REVISIONS
	08	DRW JDF 24 JUN 10	CHK CDS 25 JUN 10	APP PTS 26 JUN 10	C2 – REVISED PER MARKED PRINTS FROM FIELD OPERATIONS
	09	DRW M.U 11 DEC 18	CHK KSG 11 DEC 18	APP MA 11 DEC 18	R11-ADDED, & AD1-LOCATION REVISED.
	10	DRW M.U 30 JAN 19	CHK KSG 30 JAN 19	APP MA 30 JAN 19	NEWLY ADDED SOOT BLOWER DELETED & AD1 – RELOCATED TO IT'S ORIGINAL LOCATION.
	11	DRW M.U 19 JAN 21	CHK SVM 19 JAN 21	APP MA 19 JAN 21	C1– PLATEN SH(S–33) 3 COIL ASSY'S REMOVED PER LATEST DESIGN.

FOR TENDER PURPOSE ONLY

FOR TENDER PURPOSE ONLY

SECTIONAL SIDE ELEVATION
UPPER FURNACE

FOR CONTINUATION SEE DWG 00108–1E0103

REFERENCE DRAWINGS:

1. P.P.A.–COMPOSITE SECTIONAL SIDE ---------- 00108–1E0100

REV	DESCRIPTION	DATE	DRAWN BY	CHECKED BY	APPR'D BY
11	REVISED AS NOTED	19JAN21	M.U	SVM	MA
10	REVISED AS NOTED	30JAN19	M.U	KSG	MA
09	REVISED AS NOTED	11DEC18	M.U	KSG	MA
08	REVISED AS NOTED	24JUN10	JDF	CDS	P.T.S.
07	REVISED AS NOTED	30JAN10	GMD	JMH	P.T.S.
06	REVISED AS NOTED	06NOV09	GMD	JMH	P.T.S.
05	REVISED AS NOTED	14OCT09	GMD	JMH	P.T.S.
04	REVISED AS NOTED	31JUL09	CDS	JJK	P.T.S.
03	REVISED AS NOTED	14JUL09	CDS	JJK	P.T.S.
02	REVISED TO LATEST DESIGN	30JAN09	JDF	JJK	P.T.S.
01	REVISED TO LATEST DESIGN	10DEC08	A.VIJAY	JJK	P.T.S.
00	ISSUED FOR COORDINATION	10SEP08	A.VIJAY	JJK	P.T.S.

BHEL CUSTOMER No.: 1700 & 1701

NTPC DRG NO 9560–102–01–TR–PVM–W–013

CUSTOMER NTPC LIMITED

PROJECT **BARH SUPER THERMAL POWER PROJECT**
STAGE-II (2x660MW) - UNIT NO. 4&5
STEAM GENERATOR PACKAGE

BHARAT HEAVY ELECTRICALS LIMITED,
BOILER PLANT UNIT; TIRUCHIRAPALLI–620014

ALL DIMENSIONS IN MILLIMETRE | BHEL DRAWING NO. 0–00–027–44971 | REV. 11

PROJECTION | SCALE 1: 50

CONTRACT NO. 00108 | UNIT NO. 04 & 05

PPA– SECTIONAL SIDE ELEVATION (UPP FURN)

BARH SUPER THERMAL POWER PROJECT
STAGE–II (2 x 660 MW)

THIS DRAWING IS THE PROPERTY OF ALSTOM Power Inc. WINDSOR, CONNECTICUT 06095

SCALE : 1: 50
DRAWN BY : A.VIJAY DATE : 12 JUL 08
CHECKED BY : JJK DATE : 10 SEP 08
APPROVED BY : P.T.S DATE : 10 SEP 08

WBS CODE : 19–88–8100

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DRAWING NO. 00108–1E0101 | REV. 11

FILE NAME: 00108–1E0101
DIRECTORY: 00108

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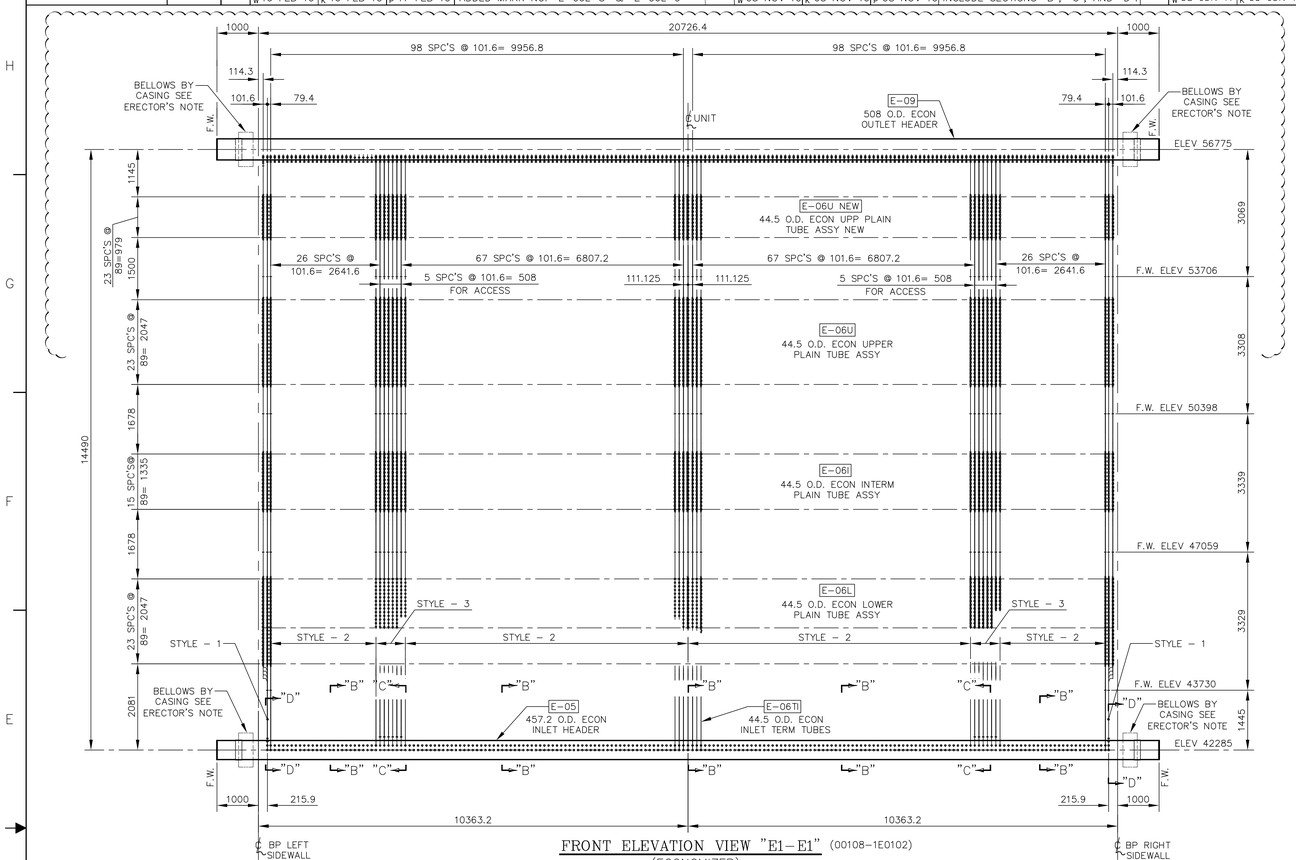
E-TENDER ENQUIRY NO.: PSER:PUR:BRH-S434:20 (ENQ:20:PP:0015:PUR:88) Date 05/03/2021.

00108-1E0102	REVISION	19	D M.U W 11 DEC 18	C KSG K 11 DEC 18	A MA P 11 DEC 18	RT2-ADDED & AD3- LOCATION REVISED.	20	D M.U W 30 JAN 19	C KSG K 30 JAN 19	A MA P 30 JAN 19	RT,AD & OD LOCATION UPDATED AND NOTE ADDED.	21	D KJC W 24OCT19	C CC K 24OCT19	A PTS P 24OCT19	C1- REVISED EL 56775 WAS EL 56425 IN DET'L "2", PER BHEL REQUEST.	22	D M.U W 19 JAN 21	C SVM K 19 JAN 21	A MA P 19 JAN 21	C1- S-40 COIL ASSY'S HEATING SURFACES REDUCED PER LATEST DESIGN.	23	D M.U W 05 FEB 21	C SVM K 05 FEB 21	A MA P 05 FEB 21	C1- REVISED EL 81205 WAS EL 80993 IN S-40 FIELD WELD PER BHEL REQUEST.

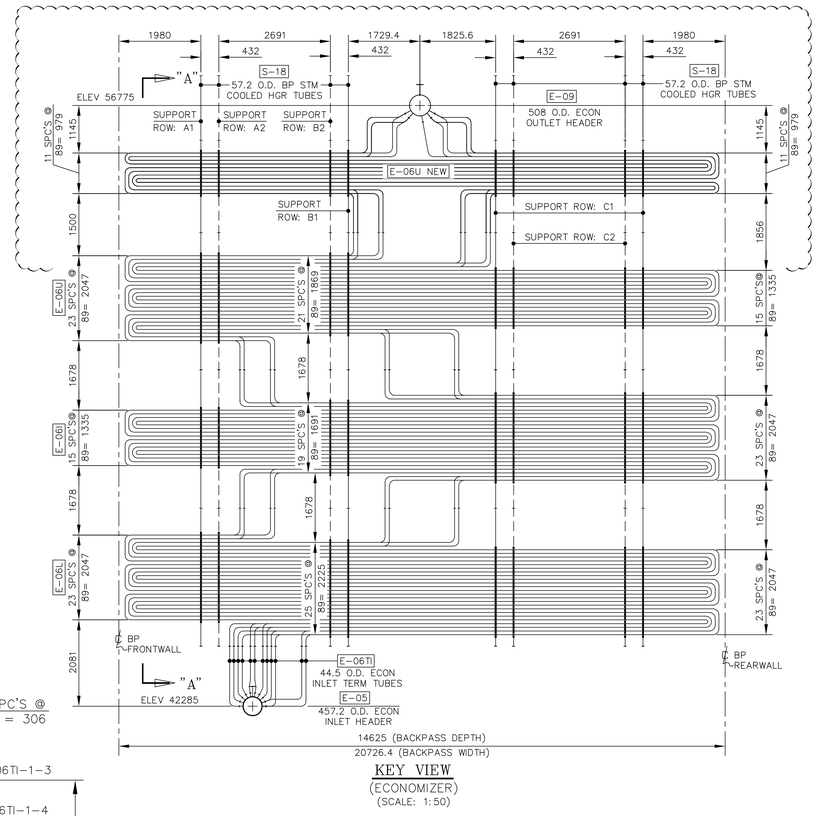
REV					
01	DRW 07/28/09	CHK 07/29/09	APP 07/30/09	JMH	CHANGED MARK NO. "E-06L-4" TO 4 REQ'D; CORRECTED MARK NO'S "E-06L-3", "E-06L-5", AND "E-06L-7"; ADDED (1) MARK FOR "E-06I-1"

E-TENDER ENQUIRY NO.: PSER:PUR:BRH-S434:20 (ENQ:20:PP:0015:PUR:88) Date 05/03/2021.

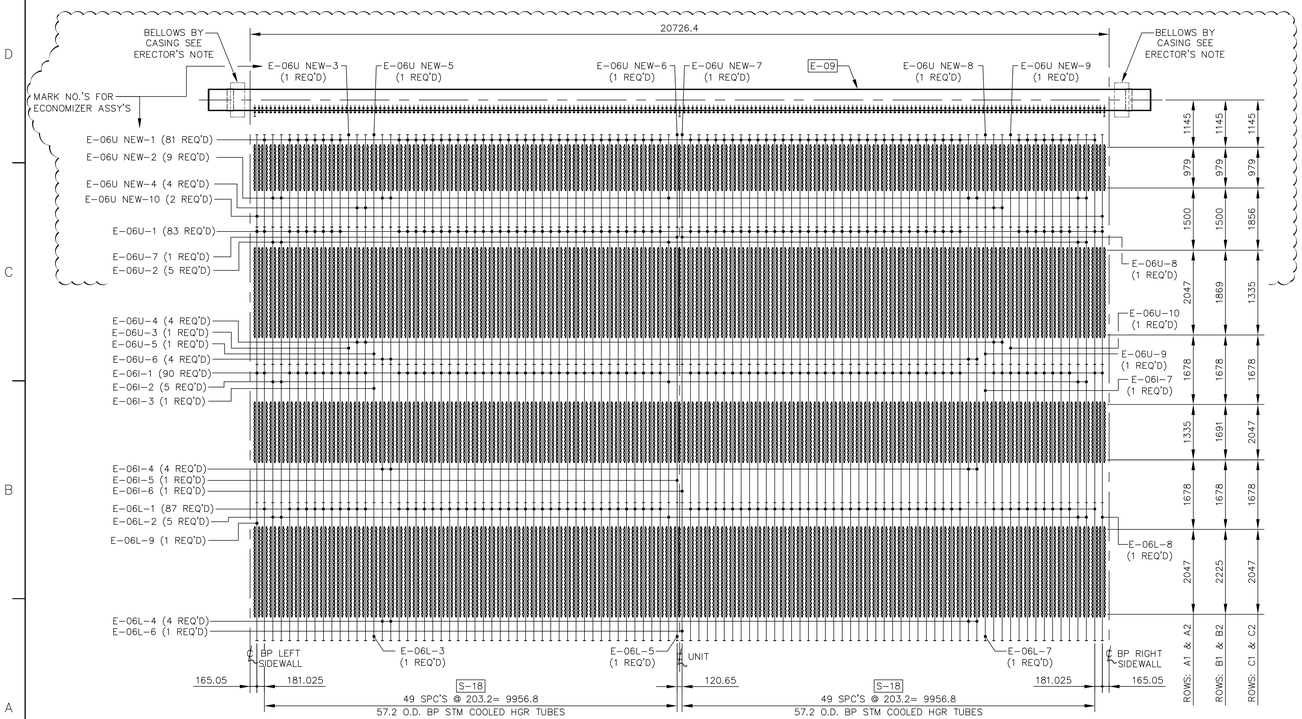
00108-1E0104	REVISION				
	02	DRW 16 FEB 10	CHK 16 FEB 10	APP 17 FEB 10	CHANGED MARK NO. "E-06L-1" TO 87 REQ'D ADDED MARK NO. "E-06L-8" & "E-06L-9"
	03	DRW 03 NOV 10	CHK 05 NOV 10	APP 08 NOV 10	C2 – REVISED SECTION "E1-E1" TO INCLUDE SECTIONS "B", "C", AND "D".
	04	DRW 08 JUN 17	CHK 09 JUN 17	APP 09 JUN 17	ADDITIONAL ECO. SURFACES ADDED PER NEW GA INPUTS
	05	DRW 11 APR 18	CHK 11 APR 18	APP 11 APR 18	ECO. TOP BANK (E-06U NEW) MODIFIED



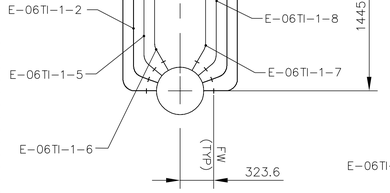
FRONT ELEVATION VIEW "E1–E1" (00108–1E0102)
(ECONOMIZER)
(SCALE: 1:50)



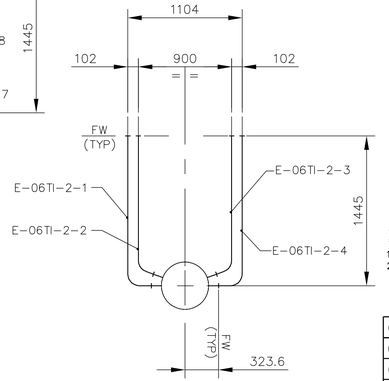
KEY VIEW
(ECONOMIZER)
(SCALE: 1:50)



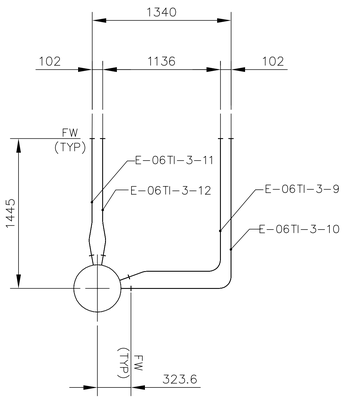
FRONT ELEVATION VIEW "A–A"
(ECONOMIZER)
(SCALE: 1:50)



SECTION "D–D"
STYLE – 1



SECTION "B–B"
STYLE – 2



SECTION "C–C"
STYLE – 3

LEGEND OF TUBE REF. NO

E–06–TI–1–1
COMPONENT PREFIX — STYLE NO. — TUBE NO.

REFERENCE DRAWINGS:

1. PPA– COMPOSITE SECTIONAL SIDE ----------00108–1E0100
2. PPA– ECTIONAL SIDE ELEV (BACKPASS) -----00108–1E0102

GENERAL NOTE:

1. SHIPPING PIECE MARK NUMBERS TO INCLUDE E–06TI–1–1 THRU E–06TI–1–8, E–06TI–2–1 THRU E–06TI–2–4, AND E–06TI–3–9 THRU E–06TI–3–12.

ERECTORS NOTE:

ERECTOR TO INSTALL BELLOWS AT HEADER PRIOR TO WELDING. WELD BELLOWS TO HEADER AFTER BELLOWS HAS BEEN WELDED TO CASING.

REV	DESCRIPTION	DATE	DRAWN BY	CHECKED BY	APPR'D BY
05	REVISED AS NOTED	11APR18	AR	KSG	MA
04	REVISED AS NOTED	08JUN17	S.JANA	DIPTENDU	A.C.
03	REVISED AS NOTED	08NOV10	KW	JJK	JMH
02	REVISED AS NOTED	16FEB10	JDF	JJK	PTS
01	REVISED AS NOTED	28JUL09	GMD	CDS	PTS
00	ISSUED FOR COORDINATION	31MAY09	GMD	CDS	PTS

BHEL CUSTOMER No.: 1700 & 1701

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NTPC DRG NO
CUSTOMER: NTPC LIMITED
PROJECT: BARH SUPER THERMAL POWER PROJECT
STAGE-II (2x660MW) - UNIT NO. 4&5
STEAM GENERATOR PACKAGE

BHARAT HEAVY ELECTRICALS LIMITED,
BOILER PLANT UNIT; TIRUCHIRAPALLI–620014

555–029

ALL DIMENSIONS IN MILLIMETRE | BHEL DRAWING NO. | REV.
PROJECTION | SCALE 1: 50 | 0–00–027–44974 | 05

CONTRACT NO. 00108 — UNIT NO. 04 & 05

P.P.A. FRONT ELEVATION VIEW "E1–E1" (ECONOMIZER)

BARH SUPER THERMAL POWER PROJECT
STAGE–II (2 x 660 MW)

THIS DRAWING IS THE PROPERTY OF ALSTOM Power Inc. WINDSOR, CONNECTICUT 06095

SCALE : 1: 50
DRAWN BY : G. D'ANDREA — DATE : 31 MAY 09
CHECKED BY : CDS — DATE : 18 JUN 09
APPROVED BY : PTS — DATE : 18 MAY 09

WBS CODE : 19–88–8100

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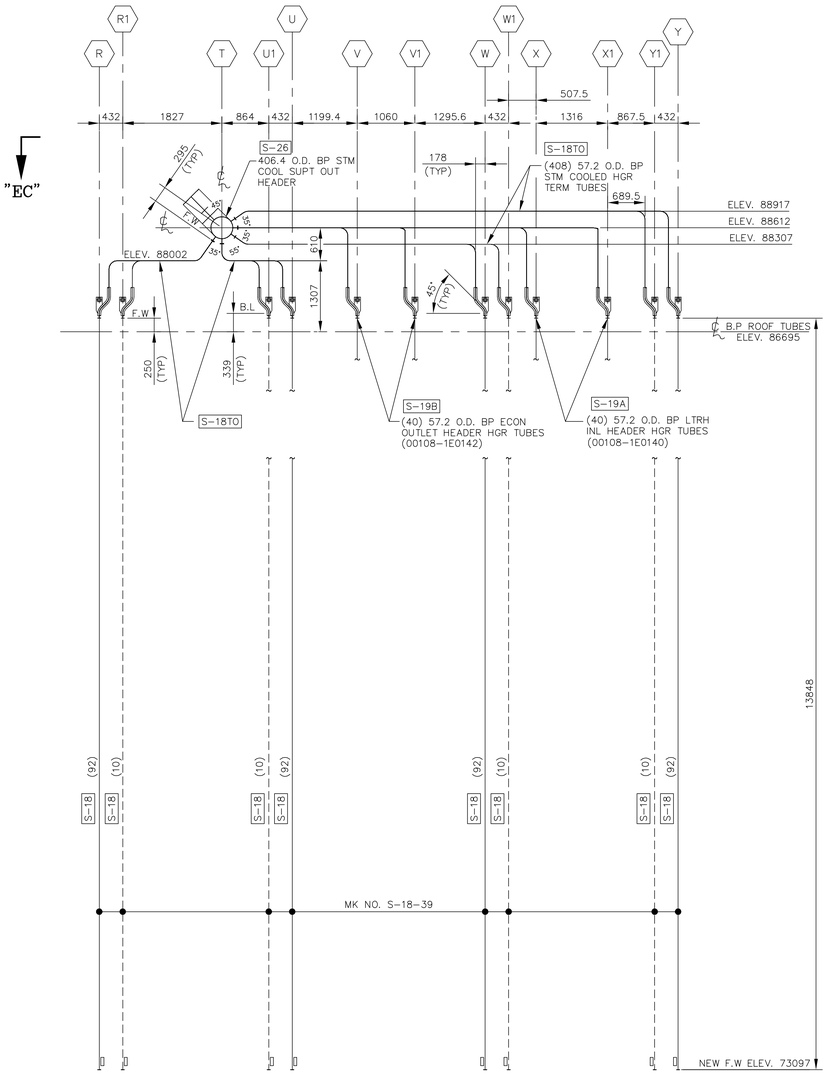
DRAWING NO. 00108–1E0104 | REV. 05

FILE NAME: 00108–1E0104
DIRECTORY: 00108

FOR TENDER PURPOSE ONLY

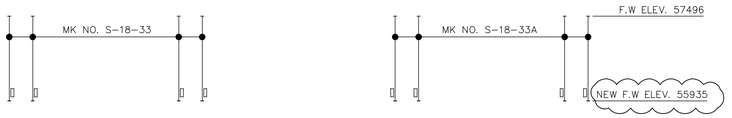
E-TENDER ENQUIRY NO.: PSER:PUR:BRH-S-18-20 (ENQ:20:PP:0015:PUR:88) Date 05/03/2021.

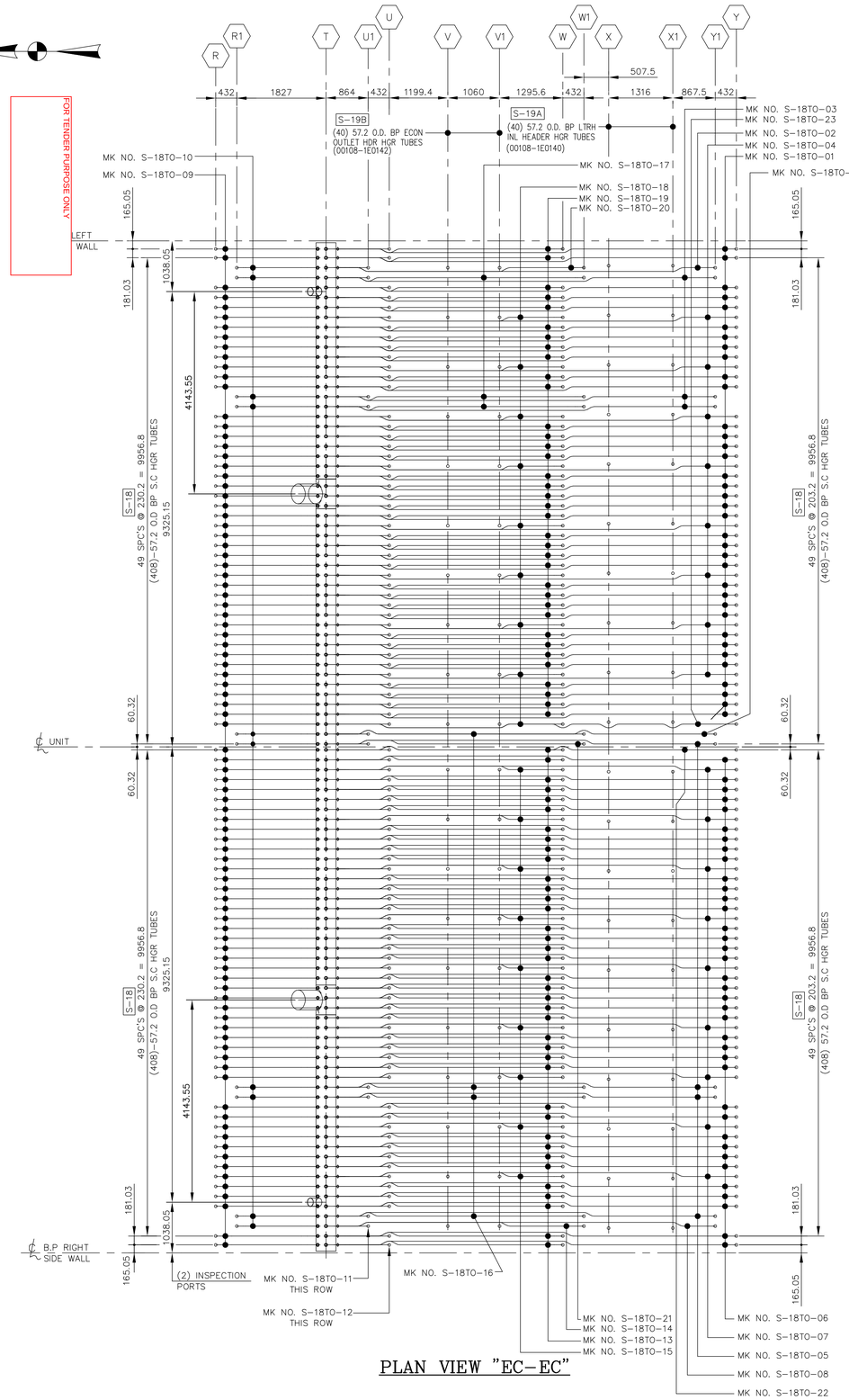
REVISION				
00108-1E0127	02	DRW GMD 05 NOV 09	CHK JMH 06 NOV 09	APP PTS 12 NOV 09	UPDATED S-26 TO LATEST REVISIONS
	03	DRW GMD 22 FEB 10	CHK JMH 23 FEB 10	APP PTS 25 FEB 10	ADDED MARK NO "S-18-33" AND RELATED ELEVATIONS
	04	DRW GMD 28 APR 10	CHK JMH 29 APR 10	APP PTS 30 APR 10	C2 - ADDED DIMENSIONS REFERENCING TEE LOCATIONS; PER CUSTOMER REQUEST.
	05	DRW FARHA 13 JUN 17	CHK DIPTENDU 13 JUN 17	APP A.C. 13 JUN 17	HANGER F.W. LOCATIONS CHANGED AS PER NEW G.A. INPUTS.
	06	DRW AR 11 APR 18	CHK KSG 11 APR 18	APP MA 11 APR 18	HANGER TUBES F.W. LOCATIONS MODIFIED AS PER NEW G.A. INPUTS.



SIDE ELEVATION VIEW

(00108-1E0102)





PLAN VIEW "EC-EC"

REFERENCE DRAWINGS:

1. PPA-COMPOSITE SECTIONAL SIDE ELEV. VIEW --- 00108-1E0102

REV	DESCRIPTION	DATE	DRAWN BY	CHECKED BY	APPR'D BY
06	REVISED AS NOTED	11APR18	AR	KSG	MA
05	REVISED AS NOTED	13JUN17	FARHA	DIPTENDU	A.C.
04	C2 - REVISED AS NOTED	28APR10	GMD	JMH	PTS
03	REVISED AS NOTED	22FEB10	GMD	JMH	P.T.S
02	REVISED AS NOTED	05NOV09	GMD	JMH	P.T.S
01	REVISED AS NOTED	12JUN09	GMD	CC	P.T.S
00	ISSUED FOR COORDINATION	20NOV08	S.ROY	J.J.K	P.T.S

BHEL CUSTOMER No.: 1700 & 1701

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NTPC DRG NO

CUSTOMER: NTPC LIMITED

PROJECT: BARH SUPER THERMAL POWER PROJECT
STAGE-II (2x660MW) - UNIT NO 4&5
STEAM GENERATOR PACKAGE

BHARAT HEAVY ELECTRICALS LIMITED,
BOILER PLANT UNIT; TIRUCHIRAPALLI-620014

355-029

ALL DIMENSIONS IN MILLIMETRE | PROJECTION | SCALE | DRG.NO. 0-00-027-45026 | REV 06

CONTRACT NO. 00108 | UNIT NO. 04 & 05

P.P.A.- ARRG'T AT BP STM COOL SUPT OUT HDR

BARH SUPER THERMAL POWER PROJECT
STAGE-II (2 x 660 MW)

THIS DRAWING IS THE PROPERTY OF ALSTOM Power Inc. WINDSOR, CONNECTICUT 06095

SCALE : 1:40
DRAWN BY : S.S.S.ROY DATE : 17 NOV 08
CHECKED BY : J.J.K DATE : 20 NOV 08
APPROVED BY : P.T.S DATE : 20 NOV 08

WBS CODE : 19-88-8100

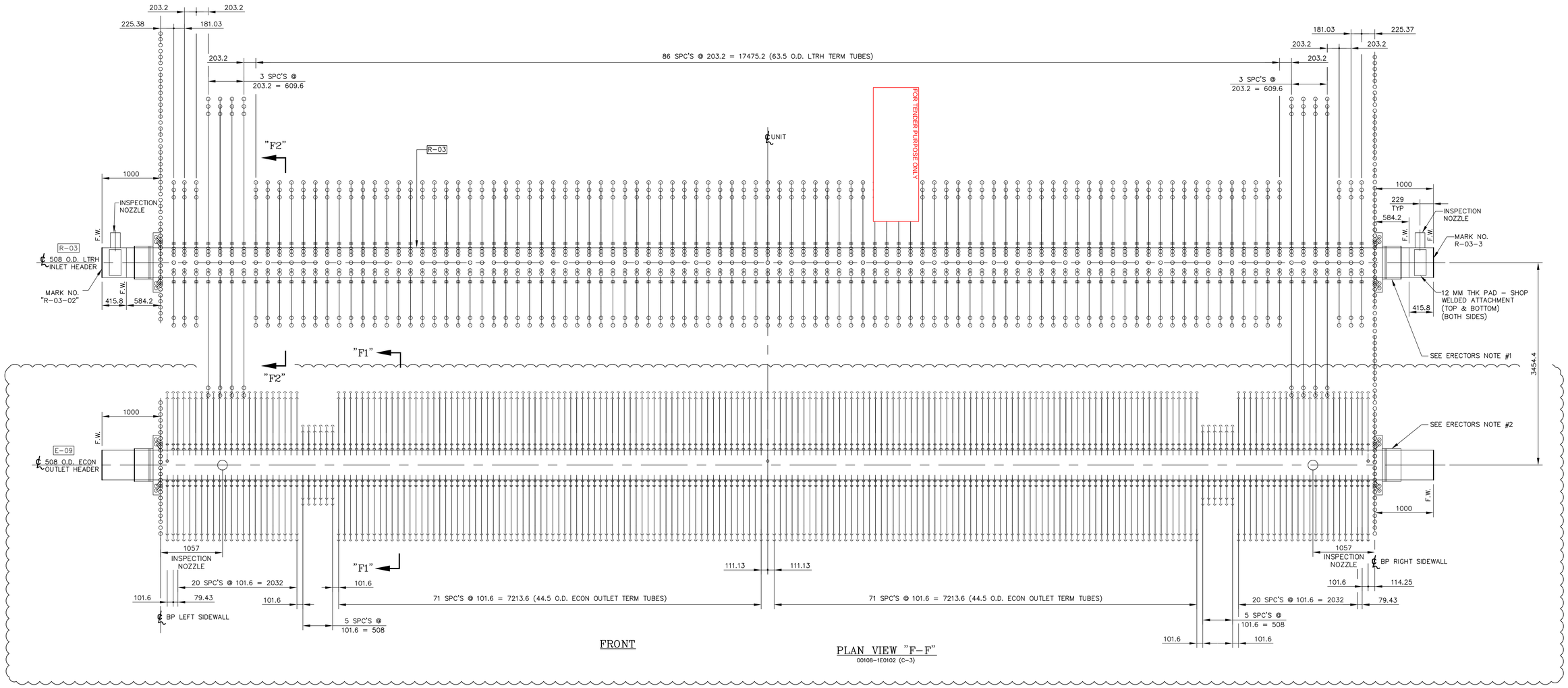
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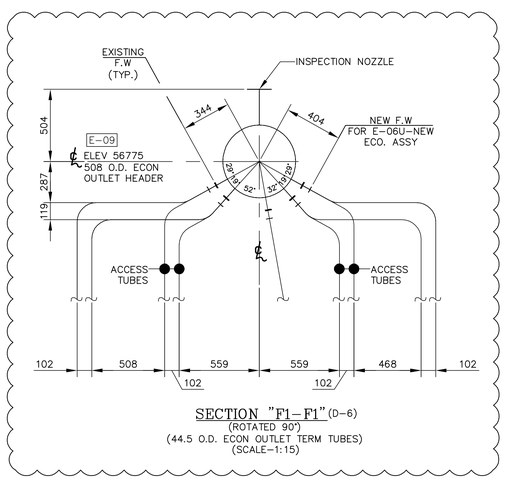
DRAWING NO. 00108-1E0127 | REV. 06

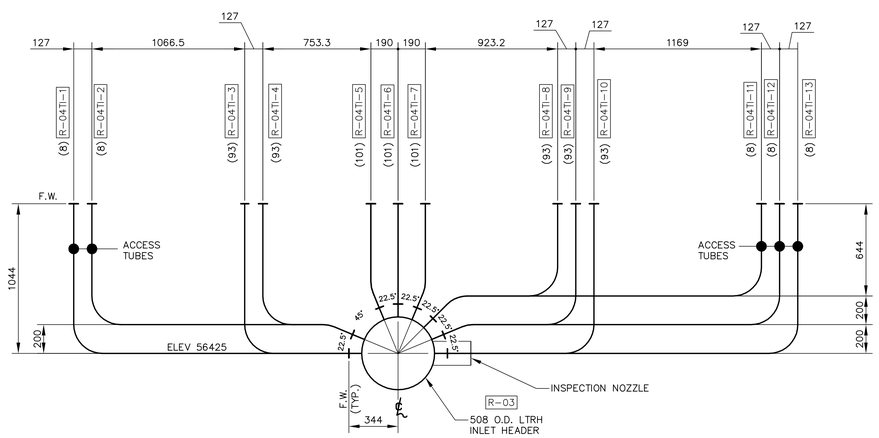
C A D FILE NAME: 00108-1E0127
DIRECTORY: 00108

E-TENDER ENQUIRY NO.: PSER:PUR:BRH-S4:19:20 (ENQ:20:PP:0015:PUR:88) Date 05/03/2021.

00108-1E0131	REVISION	01	D GMD R W 21 DEC 09	C JMH H K 22 DEC 09	A JMH P P 22 DEC 09	1044 WAS 1071, 644 WAS 671; ADDED BHEL DRAWING NUMBER	02	D JDF R W 05 JUL 10	C CDS H K 05 JUL 10	A PTS P P 05 JUN 10	C2 - REVISED PER MARKED PRINTS FROM FIELD OPERATIONS. ADDED DWG ZONE LOCATIONS TO ALL VIEWS.	03	D S.JANA R W 09 JUN 17	C DIPTENDU H K 10 JUN 17	A A.C. P P 10 JUN 17	GEOMETRY OF E-06TO TUBES MODIFIED AS PER NEW GA INPUTS	04	D AR R W 11 APR 18	C KSG H K 11 APR 18	A MA P P 11 APR 18	PLAN VIEW "F-F" & SECTION "F1-F1" UPDATED AS PER NEW GA INPUTS







REFERENCE DRAWINGS:

1. PPA - COMPOSITE SECTIONAL SIDE -------- 00108-1E0100

ERECTORS NOTES:

1. ERECTOR TO INSTALL EXPANSION BELLOWS PRIOR TO WELDING MARK NO.'S "R-03-3" & "R-03-2" (BOTH SIDES)
2. ERECTOR TO INSTALL EXPANSION BELLOWS PRIOR TO WELDING LINK (BOTH SIDES)

REV	DESCRIPTION	DATE	DRAWN BY	CHECKED BY	APPR'D BY
04	REVISED AS NOTED	11APR18	AR	KSG	MA
03	REVISED AS NOTED	09JUN17	S.JANA	DIPTENDU	A.C.
02	REVISED AS NOTED	06JUL10	JDF	CDS	PTS
01	REVISED AS NOTED	21DEC09	GMD	JMH	PTS
00	ISSUED FOR COORDINATION	06NOV08	A.VIJAY	JJK	PTS

BHEL CUSTOMER No.: 1700 & 1701

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NTPC DRG NO

CUSTOMER: NTPC LIMITED

PROJECT: BARH SUPER THERMAL POWER PROJECT
STAGE-II (2x660MW) - UNIT NO. 4&5
STEAM GENERATOR PACKAGE

BHARAT HEAVY ELECTRICALS LIMITED,
355-029
BOILER PLANT UNIT; TIRUCHIRAPALLI-620014

ALL DIMENSIONS IN MILLIMETRE | PROJECTION | SCALE | DRG.NO. 0-00-027-45029 | REV 04

CONTRACT NO. 00108 UNIT NO. 04 & 05

P.P.A.- PLAN VIEW "F-F" (ECON OUTLET HEADER & LTRH INLET HEADER)

BARH SUPER THERMAL POWER PROJECT
STAGE-II (2 x 660 MW)

THIS DRAWING IS THE PROPERTY OF ALSTOM Power Inc. WINDSOR, CONNECTICUT 06095

SCALE : 1:25
DRAWN BY : A.VIJAY DATE : 06 NOV 08
CHECKED BY : JJK DATE : 28 FEB 09
APPROVED BY : PTS DATE :

WBS CODE : 19-88-8100

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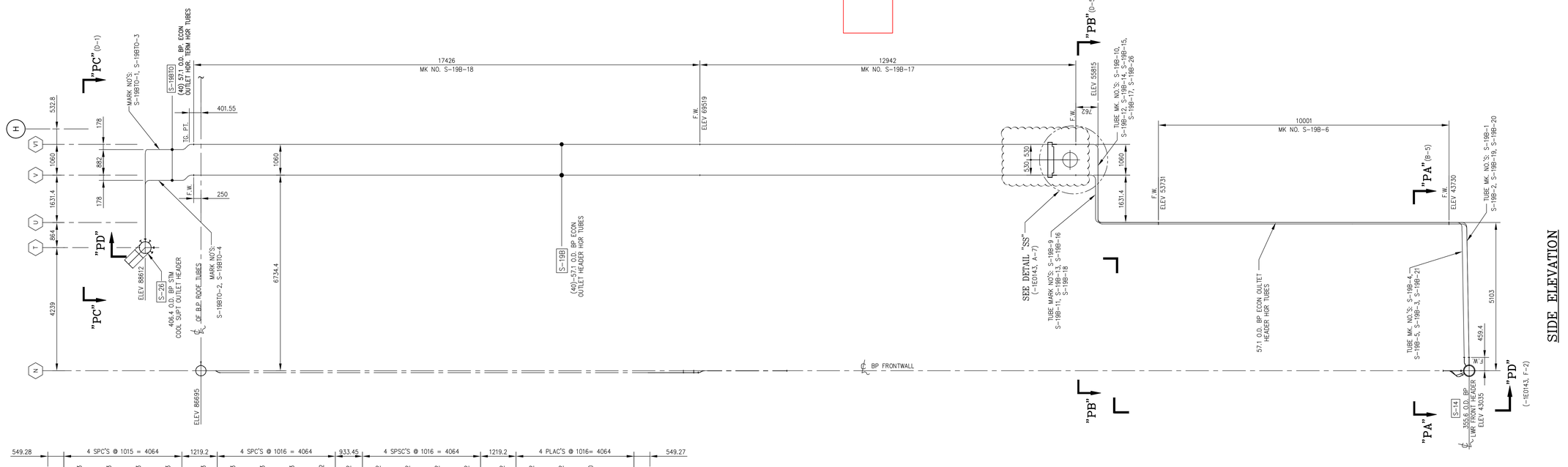
DRAWING NO. 00108-1E0131 REV. 04

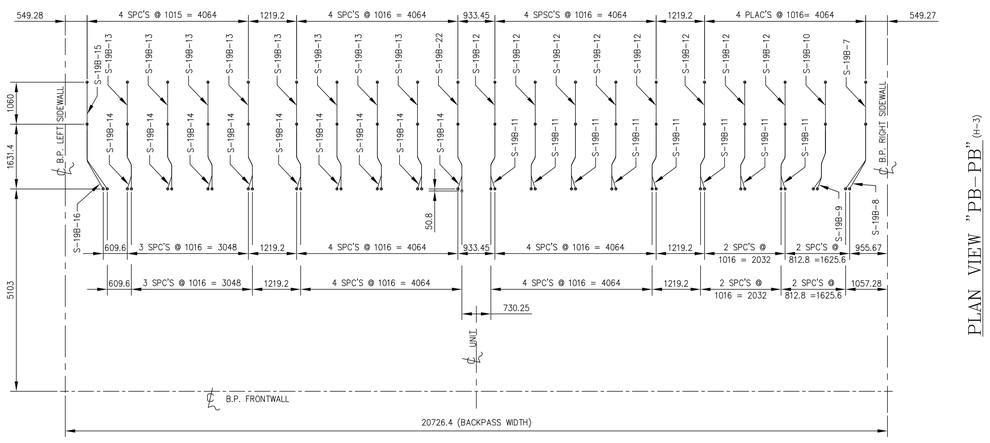
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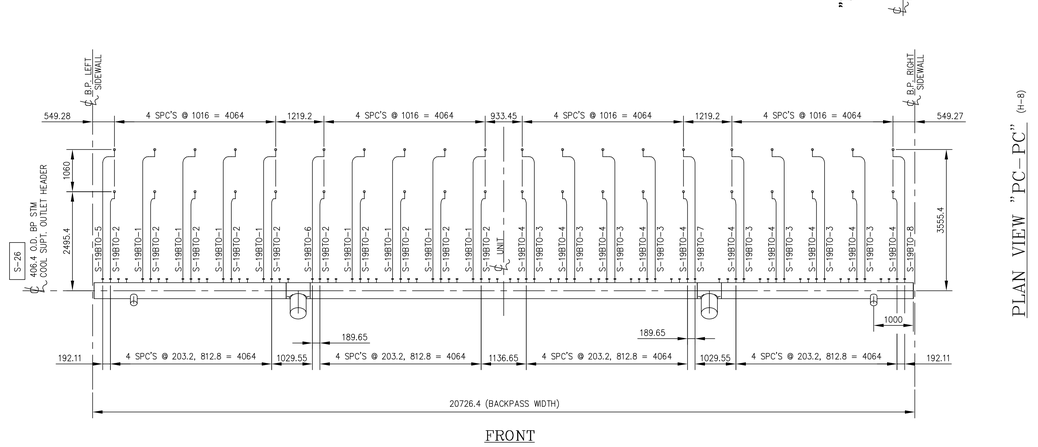
E-TENDER ENQUIRY NO.: PSER:PUR:BRH-S434:20 (ENQ:20:PP:0015:PUR:88) Date 05/03/2021.

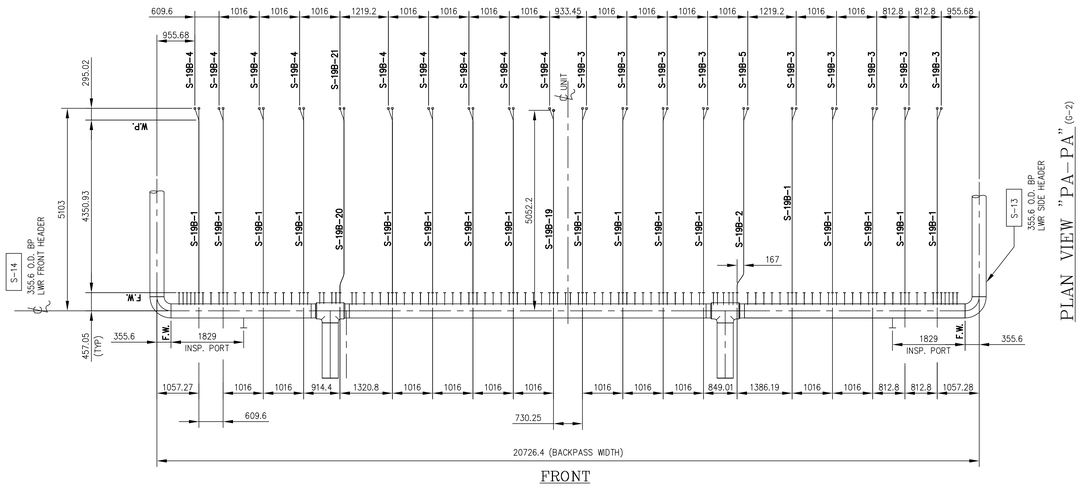
00108–1E0142	REVISION				
02	DRW 05 NOV 09 GMD	CHK 10 NOV 09 JMH	APP 12 NOV 09	UPDATED S-26 TO LATEST REVISIONS; ADDED MARK NUMBERS S-19BTO-5, S-19BTO-6, S-19BTO-7, AND S-19BTO-8.
03	DRW 07 JUL 10 JDF	CHK 07 JUL 10 CDS	APP 07 JUN 10 PTS	C2- REVISED PER MARKED PRINTS FR… DETAIL LABEL ("SS" WAS "EE"). DELET… ATIONS. CORRECTED
04	DRW 11 APR 18 AR	CHK 11 APR 18 KSG	APP 11 APR 18 MA	ECO. OUTLET HEADER ELEVATION MODIFIED AS PER NEW GA INPUTS
01	DRW 07/13/09 GMD	CHK 07/17/09 CC	APP 07/17/09 JMH	ADDED MK. NO.'S S-19B-19 THRU S-19B-21, DIMS 10001, 12942, & 17426; CORRECTED MARK NO'S TO AGREE WITH FRONT ELEVATION

FOR TENDER PURPOSE ONLY









REFERENCE DWGS:

1. P.P.A.– COMPOSITE SECTIONAL SIDE ---------- 00108–1E0100

REV	DESCRIPTION	DATE	DRAWN BY	CHECKED BY	APPR'D BY
04	REVISED AS NOTED	11APR18	AR	KSG	MA
03	REVISED AS NOTED	07JUL07	JDF	CDS	P.T.S
02	REVISED AS NOTED	05NOV09	GMD	JMH	P.T.S
01	REVISED AS NOTED	13JUL09	GMD	CC	P.T.S
00	ISSUED FOR COORDINATION	22NOV08	VARMA	J.J.K	P.T.S

BHEL CUSTOMER No. : 1700 & 1701

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NTPC ORG NO

CUSTOMER: NTPC LIMITED

PROJECT: BARH SUPER THERMAL POWER PROJECT
STAGE-II (2x660MW) - UNIT NO. 4&5
STEAM GENERATOR PACKAGE

BHARAT HEAVY ELECTRICALS LIMITED,
BOILER PLANT UNIT; TIRUCHIRAPALLI–620014

355–029

ALL DIMENSIONS IN MILLIMETRE | BHEL DRAWING NO. 0–00–027–45027 | REV. 04

PROJECTION | SCALE

CONTRACT NO. 00108 UNIT NO. 04 & 05

P.P.A.– ECON OUTLET HDR SUPPORT TUBES

BARH SUPER THERMAL POWER PROJECT
STAGE–II (2 x 660 MW)

THIS DRAWING IS THE PROPERTY OF ALSTOM Power Inc. WINDSOR, CONNECTICUT 06095

SCALE : 1:50
DRAWN BY : VARMA DATE : 20 NOV 08
CHECKED BY : J.J.K DATE : 22 NOV 08
APPROVED BY : P.T.S DATE : 22 NOV 08

WBS CODE : 19–88–8100

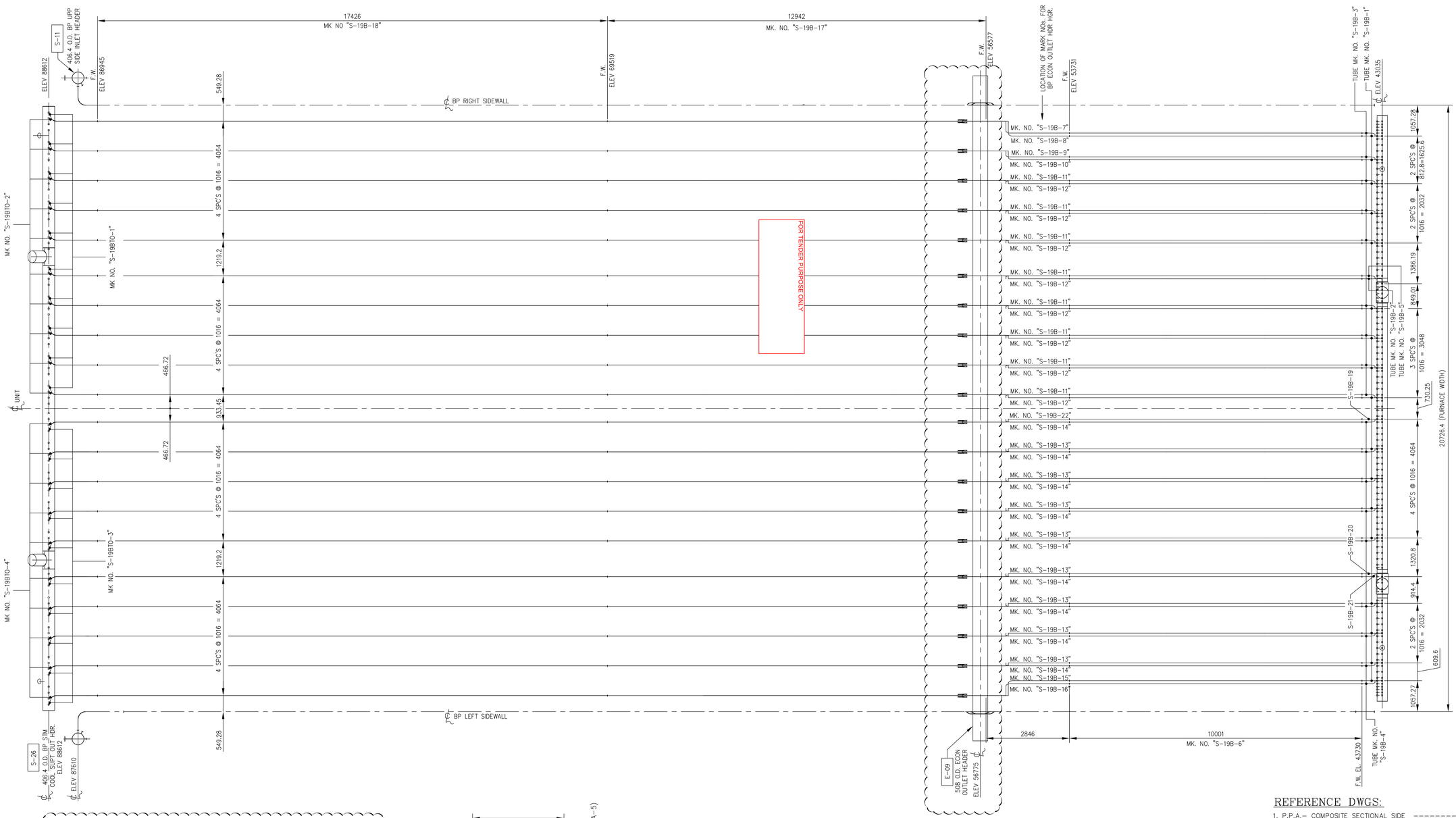
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DRAWING NO. 00108–1E0142 REV. 04 E

FILE NAME: 00108–1E0142
DIRECTORY: 00108

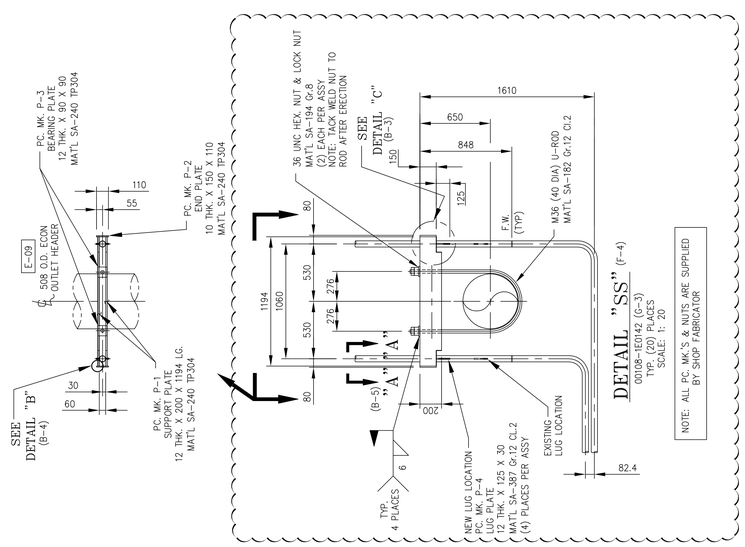
E-TENDER ENQUIRY NO.: PSER:PUR:BRH-S4:19-20 (ENQ:20:PP:0015:PUR:88) Date 05/03/2021.

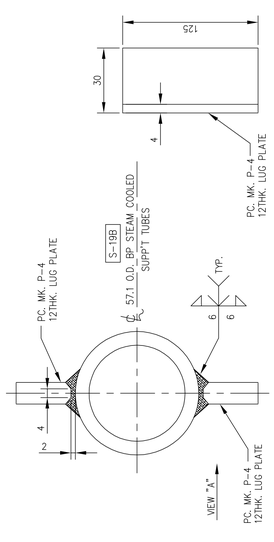
00108-1E0143	REVISION	03	DWN JDF 07 JUL 10	CHK CDS 07 JUL 10	APP PTS 07 JUN 10	C2- REVISED PER MARKED PRINTS FROM FIELD OPERATIONS. ADDED DWG ZONE LOCATION TO VIEW "A" ADDED DWG & CORRECTED LOC AT DETAIL "SS" (G-3 WAS F-4). DELETED REF DWG #2.	04	DRW AR 11 APR 18	CHK KSG 11 APR 18	APP MA 11 APR 18	ECO. OUTLET HEADER ELEVATION MODIFIED FROM 56425 TO 56775 AS PER NEW GA INPUTS

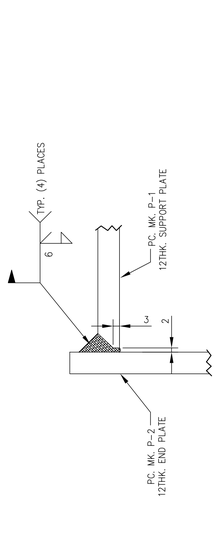


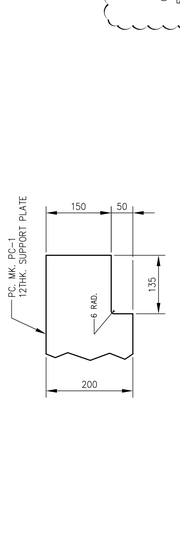
FRONT ELEVATION VIEW "PD-PD" (-1E0142, F-1)

(SCALE 1:50)









REFERENCE DWGS:

1. P.P.A.- COMPOSITE SECTIONAL SIDE ---------- 00108-1E0100

REV	DESCRIPTION	DATE	DRAWN BY	CHECKED BY	APPR'D BY
04	REVISED AS NOTED	11APR18	AR	KSG	MA
03	REVISED AS NOTED	07JUL10	JDF	CDS	P.T.S
02	REVISED AS NOTED	05NOV09	GMD	JMH	P.T.S
01	REVISED AS NOTED	13JUL09	GMD	CC	P.T.S
00	ISSUED FOR COORDINATION	22NOV08	VARMA	J.J.K	P.T.S

BHEL CUSTOMER No. : 1700 & 1701

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NTPC DRG NO

CUSTOMER: NTPC LIMITED

PROJECT: BARH SUPER THERMAL POWER PROJECT
STAGE-II (2x660MW) - UNIT NO 4&5
STEAM GENERATOR PACKAGE

BHARAT HEAVY ELECTRICALS LIMITED,
BOILER PLANT UNIT; TIRUCHIRAPALLI-620014

155-029
ALL DIMENSIONS IN MILLIMETRE
PROJECTION
SCALE
DRG.NO. 0-00-027-45028
REV 04

CONTRACT NO. 00108 UNIT NO. 04 & 05

P.P.A.- ECON OUTLET HDR SUPPORT TUBES

BARH SUPER THERMAL POWER PROJECT
STAGE-II (2 x 660 MW)

THIS DRAWING IS THE PROPERTY OF ALSTOM Power Inc. WINDSOR, CONNECTICUT 06095

SCALE : (AS NOTED)
DRAWN BY : VARMA DATE : 20 NOV 08
CHECKED BY : J.J.K DATE : 22 NOV 08
APPROVED BY : P.T.S DATE : 22 NOV 08

WBS CODE : 19-88-8100

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DRAWING NO. 00108-1E0143 REV. 04

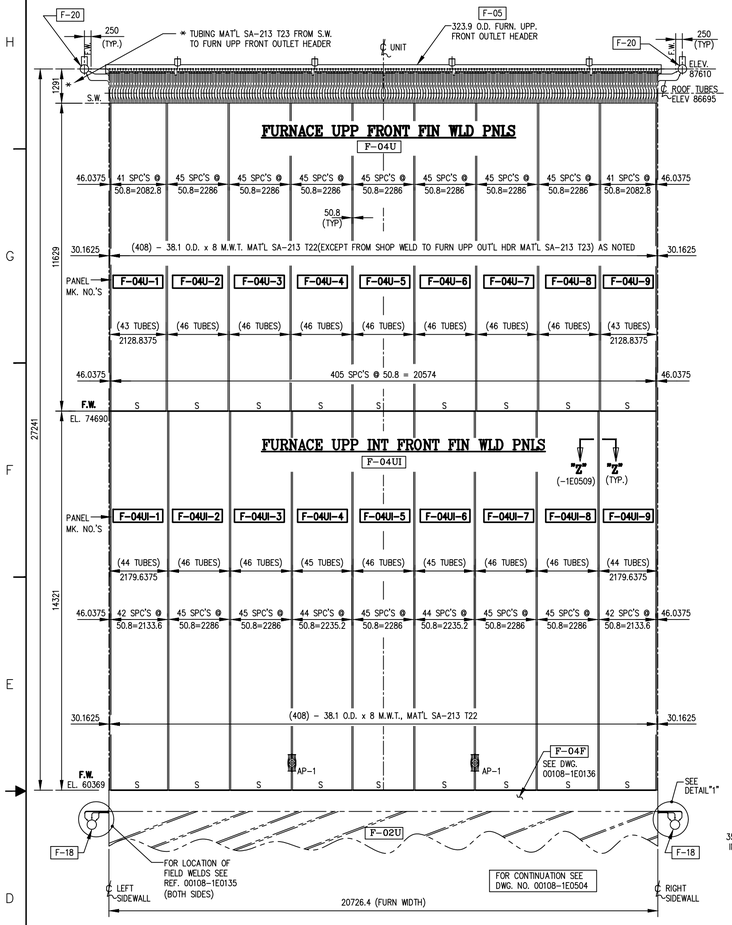
FILE NAME: 00108-1E0143
DIRECTORY: 00108

E-TENDER ENQUIRY NO.: PSER:PUR:BRH-S434:20 (ENQ:20:PP:0015:PUR:88) Date 05/03/2021.

00108–1E0500	REVISION	05	D JDF R RM 30 JUN 10	C CDS H HK 30 JUN 10	A PTS P PP 30 JUN 10	C2 – REVISED PER MARKED PRINTS FROM FIELD OPERATIONS. ADDED DWG ZONE LOCATIONS AT ALL SECTIONS & DETAILS.
		06	D AR R WN 11 APR 18	C KSG H K 11 APR 18	A MA P 11 APR 18	RT OPENINGS UPDATED AS PER NEW G.A. INPUTS.
		07	D M.U R W 11 DEC 18	C KSG H K 11 DEC 18	A MA P 11 DEC 18	RT1,RT2–ADDED & AD1, AD3– LOCATION REVISED.
		08	D M.U R W 30 JAN 19	C KSG H K 30 JAN 19	A MA P 30 JAN 19	RT,AD & OD LOCATION UPDATED, NEWLY ADDED SOOT BLOWER DELETED & AD1 – RELOCATED TO IT'S ORIGINAL LOCATION.

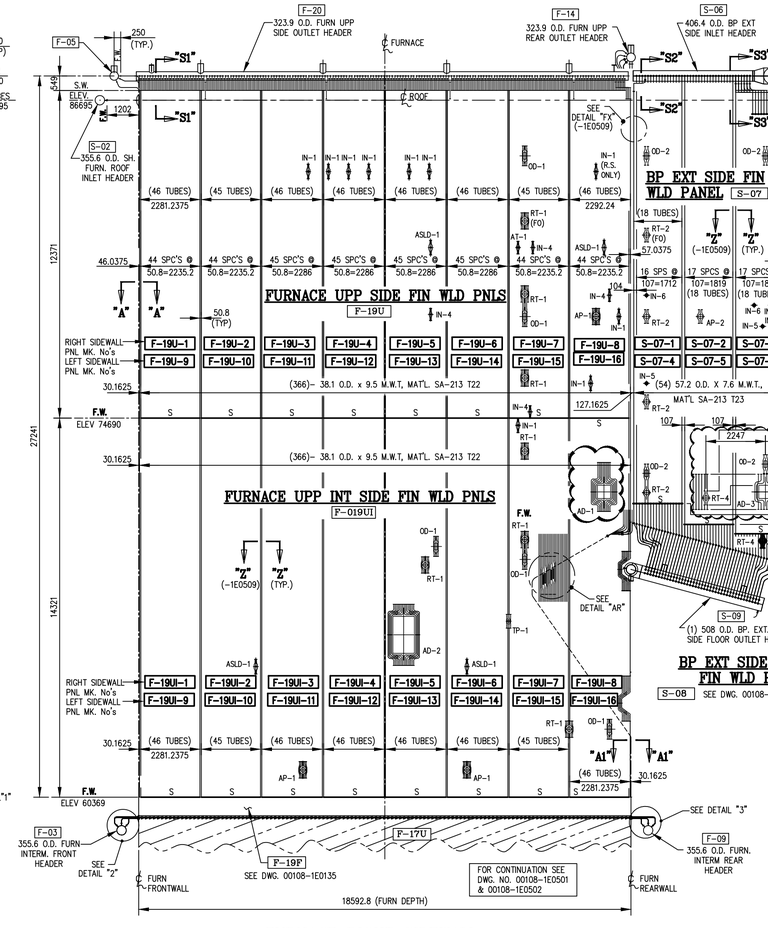
FURNACE FRONTWALL

ELEVATION VIEW – CASING SIDE



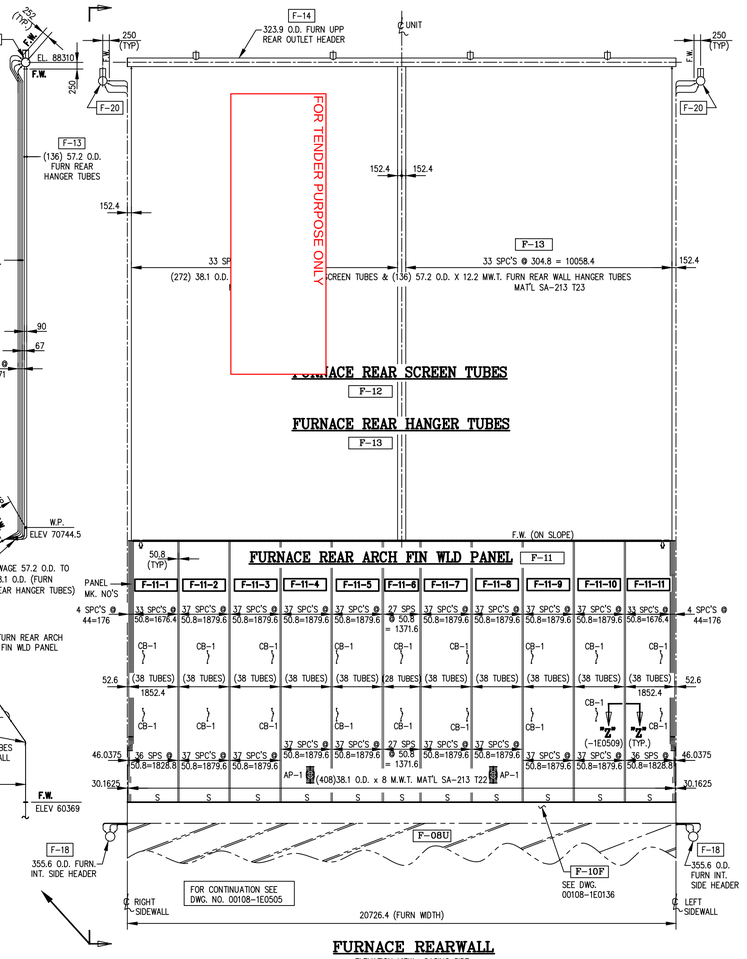
FURNACE RIGHT SIDEWALL (AS SHOWN AND NOTED)
FURNACE LEFT SIDEWALL (OPP. HAND AND NOTED)

(ELEVATION VIEW – CASING SIDE)



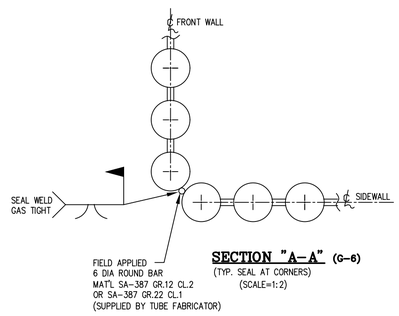
FURNACE REARWALL

ELEVATION VIEW– CASING SIDE



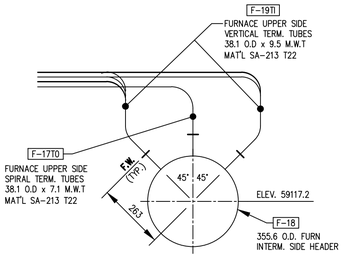
SECTION "A–A" (G–6)

(TYP. SEAL AT CORNERS) (SCALE=1:2)



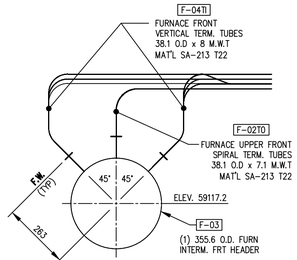
DETAIL "1" (E–6)

FOR LOCATION OF FIELD WELDS SEE REF. DWG. 00108–1E0135 (SCALE=1:10)



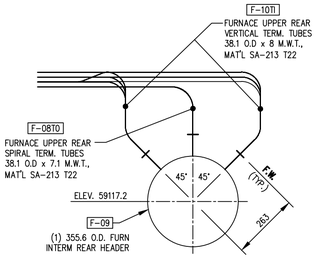
DETAIL "2" (D–6)

FOR LOCATION OF FIELD WELDS SEE REF. DWG. 00108–1E0136 (SCALE=1:10)



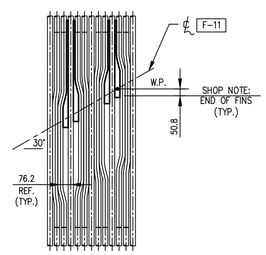
DETAIL "3" (D–4)

FOR LOCATION OF FIELD WELDS SEE REF. DWG. 00108–1E0136 (SCALE=1:10)



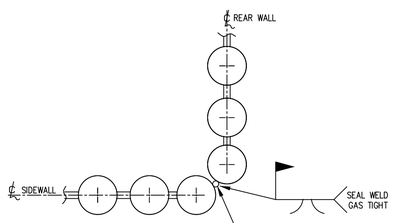
DETAIL "AR" (E–4)

RIGHT SIDEWALL (SHOWN)
LEFT SIDEWALL (OPPOSITE HAND)
(SCALE: 1:15)



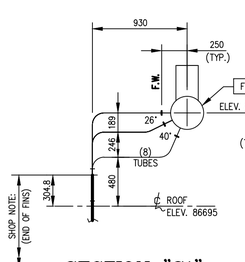
SECTION "A1–A1" (E–4)

(TYP. SEAL AT CORNERS) (SCALE=1:2)



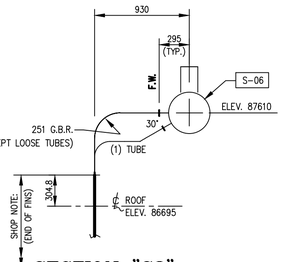
SECTION "S1" (H–6)

(SCALE 1:20)



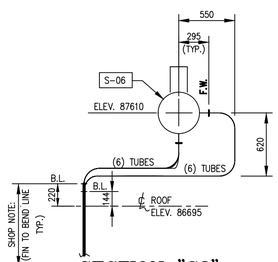
SECTION "S2" (H–4)

(SCALE 1:20)



SECTION "S3" (H–4)

(SCALE 1:20)



OPENING LEGEND

(FOR ADDITIONAL INFO. SEE REF. DWG. 00108–1D3301)

INSERT CODE	QTY.	DESCRIPTION
AD–1	2	500 x 500 ACCESS DOOR
AD–2	2	813 x 1397 ACCESS DOOR
AD–3	2	500 x 500 ACCESS DOOR
OD–1	10	100 x 250 OBS DOOR
OD–2	8	100 x 250 OBS DOOR
RT–1	12	RETRAC. SOOT BLOWER
RT–2	6	RETRAC. SOOT BLOWER
RT–1(FO)	2	FUTURE RETRAC. SOOT BLOWER W/TUBE INSERTS
RT–2(FO)	2	FUTURE RETRAC. SOOT BLOWER W/TUBE INSERTS
TP–1	2	TEMP PROBE
IN–1	19	INSTRUMENT INSERT
CB–1	18	CABLE PIPE OPENING
ASLD–1	8	ACOUSTIC STEAM LEAK DETECTION
AP–1	10	ACOUSTIC PYROMETER
AP–2	2	ACOUSTIC PYROMETER
IN–4	8	INSTRUMENT INSERT
IN–5	6	INSTRUMENT INSERT (NO TUBE INSERTS)
IN–6	6	INSTRUMENT INSERT (NO TUBE INSERTS)
AP–3	2	INSTRUMENT INSERT
RT–4	4	RETRAC. SOOT BLOWER

FOR OPENING LOCATIONS SEE GENERAL ARRG'T DRAWINGS. SEE DWG. 00108–1E0509 FOR ERECTOR'S NOTE & FIN MAT'L.

REFERENCE DRAWINGS:

1. PPA – COMPOSITE SECTIONAL SIDE ---------00108–1E0100

REV	DESCRIPTION	DATE	DRAWN BY	CHECKED BY	APPR'D BY
08	REVISED AS NOTED	30JAN19	M.U	KSG	MA
07	REVISED AS NOTED	11DEC18	M.U	KSG	MA
06	REVISED AS NOTED	11APR18	AR	KSG	MA
05	REVISED AS NOTED	30JUN10	JDF	CDS	PTS
04	REVISED AS NOTED	13NOV09	CC	KJC	PTS
03	REVISED AS NOTED	24JUL09	KJC	JJK	PTS
02	REVISED AS NOTED	27MAR09	KJC	JJK	PTS
01	REVISED AS NOTED	06FEB09	KJC	JJK	PTS
00	ISSUED FOR COORDINATION	11SEP08	VARMA	KJC	JMH

BHEL CUSTOMER No. : 1700 & 1701

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NTPC DRG NO

CUSTOMER: NTPC LIMITED

PROJECT: BARH SUPER THERMAL POWER PROJECT
STAGE–II (2x660MW) - UNIT NO. 4&5
STEAM GENERATOR PACKAGE

BHARAT HEAVY ELECTRICALS LIMITED,
BOILER PLANT UNIT; TIRUCHIRAPALLI–620014

ALL DIMENSIONS IN MILLIMETRE | BHEL DRAWING NO. 0–00–027–45015 | REV. 08

PROJECTION | SCALE

CONTRACT NO. 00108 UNIT NO. 4 & 5

P.P.A – PANEL ARRANGEMENT FURNACE
(VERTICAL WALL)
BARH SUPER THERMAL POWER PROJECT
STAGE–II (2 x 660 MW)

THIS DRAWING IS THE PROPERTY OF ALSTOM Power Inc. WINDSOR, CONNECTICUT 06095

SCALE : 1:75
DRAWN BY : A.VIJAY DATE : 13 AUG 08
CHECKED BY : KJC DATE : 18 SEP 08
APPROVED BY : JMH DATE : 18 SEP 08

WBS CODE : 19–88–8150

ALSTOM

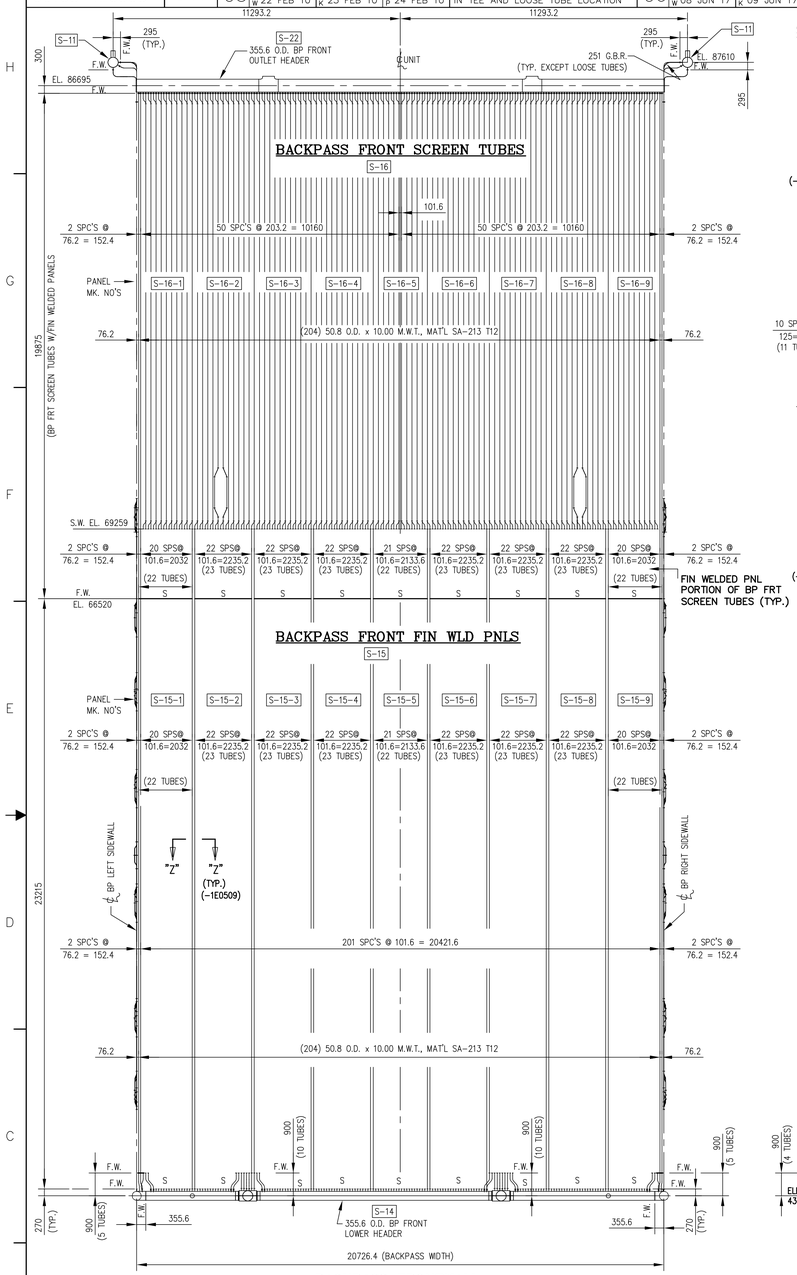
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DRAWING NO. 00108–1E0500 REV. 08 E

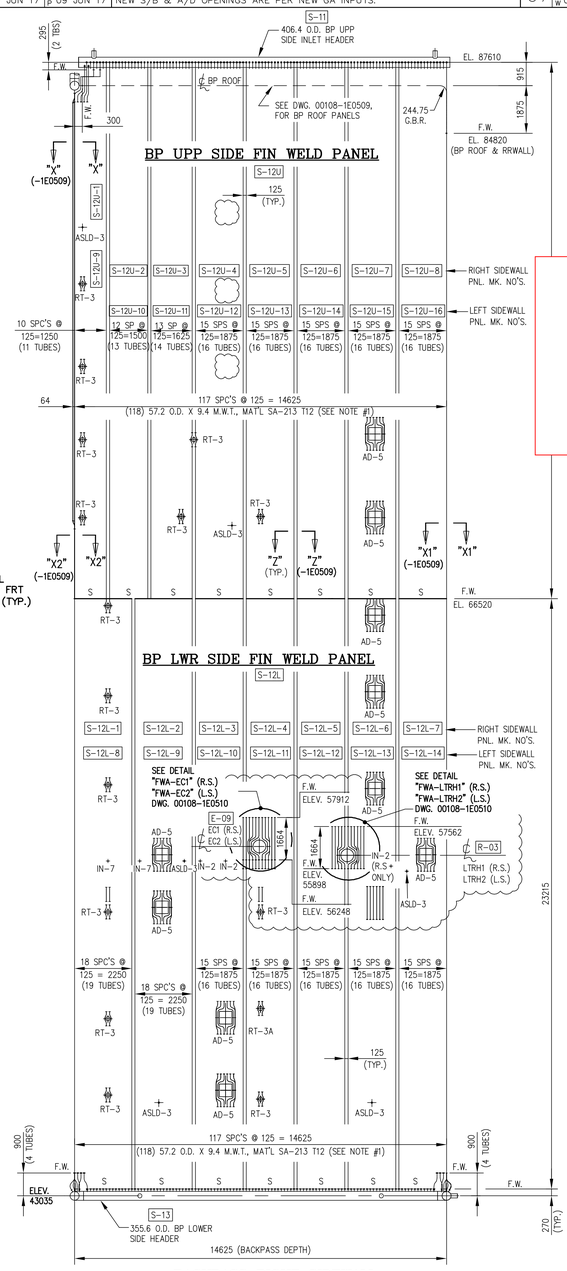
FILE NAME: 00108–1E0500.DWG
DIRECTORY: 00108

E-TENDER ENQUIRY NO.: PSER:PUR:BRH-S434:20 (ENQ:20:PP:0015:PUR:88) Date 05/03/2021.

00108-1E0503	REVISION				
08	D RW 11 APR 18	C KSG K 11 APR 18	A MA P 11 APR 18	AD-5 & RT-3 LOCATIONS AND QUANTITY UPDATED AS PER NEW GA INPUTS	
07	D TGK W 08 JUL 17	C DIPTENDU K 08 JUL 17	A A.C. P 08 JUL 17	IN-2, IN-7, AD-5, ASLD-3 & TWO RT-3 LOCATION CHANGED	
06	D FARHA RW 08 JUN 17	C DIPTENDU K 09 JUN 17	A A.C. P 09 JUN 17	B.P. SIDE WALL PANEL ARRGT. MODIFIED FOR ADDITIONAL ECON. & LTRH SURFACES. NEW S/B & A/D OPENINGS ARE PER NEW GA INPUTS.	
05	D GMD RW 22 FEB 10	C JMH K 23 FEB 10	A PTS P 24 FEB 10	UPDATED S-14 TO REFLECT CHANGES IN TEE AND LOOSE TUBE LOCATION	
04	D CC RW 13 NOV 09	C KJC K 13 NOV 09	A PTS P 13 NOV 09	ADDED (2) IN-7 AND (2) ADDITIONAL IN-2 INSTRUMENT INSERTS PER LATEST G.A.'S AND UPDATED OPENING LEGEND TABLE QTY'S.	

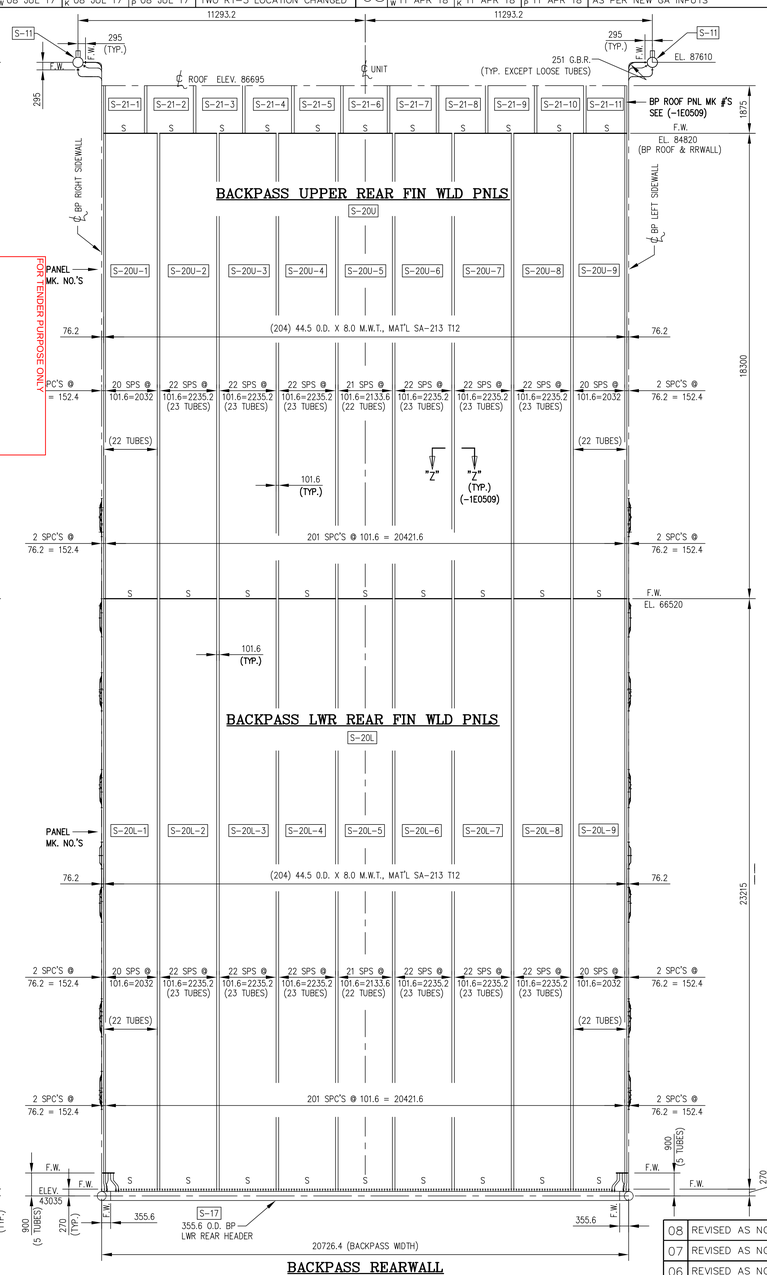


BACKPASS FRONTWALL
ELEVATION VIEW – CASING SIDE



BACKPASS RIGHT SIDEWALL
(AS SHOWN & NOTED)

BACKPASS LEFT SIDEWALL
(OPPOSITE & NOTED)
ELEVATION VIEW–CASING SIDE



BACKPASS REARWALL
ELEVATION VIEW – CASING SIDE

(QTY'S FOR BACKPASS SIDEWALLS)

OPENING LEGEND
(FOR ADDITIONAL INFO. SEE REF. DWG. 00108-1D3301)

INSERT CODE	QTY.	M.W.T.	DESCRIPTION
AD-5	20	10.2	500 x 500 ACCESS DOOR
RT-3	32	10.2	SOOT BLOWER RETRACT
LTRH1	1	10.2	LTRH INLET OPENING
LTRH2	1	10.2	LTRH INLET OPENING
EC1	1	10.2	ECON OUTLET OPENING
EC2	1	10.2	ECON OUTLET OPENING
IN-2	5	——	INSTRUMENT OPENING (NO TUBE INSERTS)
IN-7	4	——	INSTRUMENT OPENING (NO TUBE INSERTS)
ASLD-3	12	——	ACOUSTIC STEAM LEAK DETECTION (NO TUBE INSERTS)

NOTE 1:
ALL BACKPASS SIDEWALL TUBE INSERTS, M.W.T. TO BE 10.2

REFERENCE DRAWINGS: –

1. PPA – COMPOSITE SECTIONAL SIDE -------- 00108-1E0100

FOR OPENING LOCATIONS SEE GENERAL ARRG'T DRAWINGS. SEE DWG. 00108-1E0509 FOR ERECTOR'S NOTE & FIN MAT'L.

REV	DESCRIPTION	DATE	DRAWN BY	CHECKED BY	APPR'D BY
08	REVISED AS NOTED	11APR18	AR	KSG	MA
07	REVISED AS NOTED	08JUL17	TGK	DIPTENDU	A.C.
06	REVISED AS NOTED	08JUN17	FARHA	DIPTENDU	A.C.

BHEL CUSTOMER No.: 1700 & 1701

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NTPC DRG NO

CUSTOMER: NTPC LIMITED

PROJECT: BARH SUPER THERMAL POWER PROJECT
STAGE-II (2x660MW) - UNIT NO. 4&5
STEAM GENERATOR PACKAGE

BHARAT HEAVY ELECTRICALS LIMITED,
BOILER PLANT UNIT; TIRUCHIRAPALLI–620014

355–029 ALL DIMENSIONS IN MILLIMETRE

PROJECTION | SCALE | BHEL DRAWING NO. 0–00–027–45018 | REV. 08

CONTRACT NO. 00108 | UNIT NO. 4 & 5

P.P.A.– PANEL ARRANGEMENT–BACKPASS

BARH SUPER THERMAL POWER PROJECT
STAGE–II (2 x 660 MW)

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SCALE : NONE
DRAWN BY : A.VIJAY DATE : 10 JLY 08
CHECKED BY : K.JC DATE : 23 OCT 08
APPROVED BY : P.TS DATE : 24 OCT 08

WBS CODE : 19–88–8150

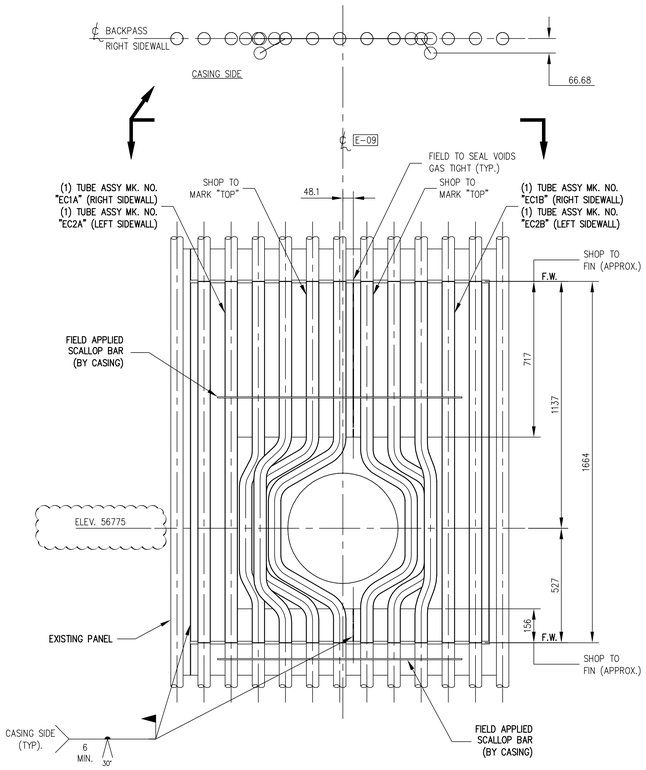
DRAWING NO. 00108–1E0503 | REV. 08 | E

FILE NAME: 00108–1E0503.DWG
DIRECTORY: 00108

E-TENDER ENQUIRY NO.: PSER:PUR:BRH-S4:19:20 (ENQ:20:PP:0015:PUR:88) Date 05/03/2021.

00108-1E0510	REVISION	01	D R W GMD 04 JUN 10	C H K JMH 04 JUN 10	A P P PTS 09 JUN 10	C2- REVISED BHEL DWG NUMBER PER CUSTOMER REQUEST. REVISED PER MARKED PRINTS FROM FIELD OPERATIONS. ADDED DWG ZONE LOCATIONS TO BOTH VIEWS.	02	D R W AR 11 APR 18	C H K KSG 11 APR 18	A P P MA 11 APR 18	ECO. OUTLET HEADER ELEVATION MODIFIED FROM 56425 TO 56775 AS PER NEW GA INPUTS

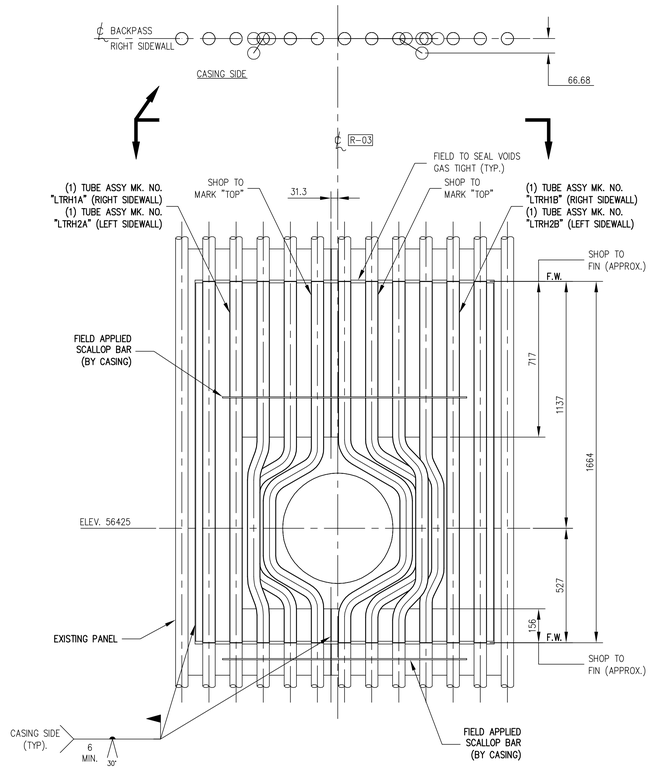
FOR TENDER PURPOSE ONLY



DETAIL "FWA-EC1" (AS SHOWN)
DETAIL "FWA-EC2" (OPPOSITE SIDE)

(SCALE = 1:10)
BACKPASS RIGHT SIDEWALL ELEV. VIEW - CASING SIDE AS SHOWN
LOCATION (SEE DWG. 00108-00503) (D-5)
LEFT SIDE OPPOSITE HAND - MK. NO. "EC2A", "EC2B"

TUBE ASS'Y MK "EC1A", "EC1B", "EC2A", "EC2B"
TO BE INSTALLED AFTER ECON OULET HDR IS IN PLACE



DETAIL "FWA-LTRH1" (AS SHOWN)
DETAIL "FWA-LTRH2" (OPPOSITE SIDE)

(SCALE = 1:10)
BACKPASS RIGHT SIDEWALL ELEV. VIEW - CASING SIDE AS SHOWN
LOCATION (SEE DWG. 00108-00503) (D-4)
LEFT SIDE OPPOSITE HAND - MK. NO. "LTRH2A", "LTRH2B"

TUBE ASS'Y MK "LTRH1A", "LTRH1B", "LTRH2A", "LTRH2B"
TO BE INSTALLED AFTER LTRH INLET HDR IS IN PLACE

REFERENCE DRAWINGS:

P.P.A.- COMPOSITE SECTIONAL SIDE _____ 00108-1E0100

REV	DESCRIPTION	DATE	DRAWN BY	CHECKED BY	APPR'D BY
02	REVISED AS NOTED	11APR18	AR	KSG	MA
01	REVISED AS NOTED	04JUN10	GMD	JMH	P.T.S.
00	ISSUED FOR COORDINATION	30JUL09	JDF	JJK	P.T.S.

BHEL CUSTOMER No.: 1700 & 1701

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NTPC DRG NO

CUSTOMER: NTPC LIMITED

PROJECT: BARH SUPER THERMAL POWER PROJECT
STAGE-II (2x660MW) - UNIT NO. 4&5
STEAM GENERATOR PACKAGE

BHARAT HEAVY ELECTRICALS LIMITED,
BOILER PLANT UNIT; TIRUCHIRAPALLI-620014

355-029

ALL DIMENSIONS IN MILLIMETRE | BHEL DRAWING NO. 0-00-027-45039 | REV. 02

PROJECTION | SCALE

CONTRACT NO. 00108 | UNIT NO. 4 & 5

P.P.A.-FIELD WELDED ATTACHMENTS-BACKPASS

BARH SUPER THERMAL POWER PROJECT
STAGE-II (2 x 660 MW)

THIS DRAWING IS THE PROPERTY OF
ALSTOM Power Inc.
WINDSOR, CONNECTICUT 06095

SCALE : NONE
DRAWN BY : JDF DATE : 20 JUL 09
CHECKED BY : JJK. DATE : 29 JUL 09
APPROVED BY : PTS DATE :

WBS CODE : 19-88-8150

ALSTOM

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DRAWING NO. 00108-1E0510 | REV. 02

FILE NAME: 00108-1E0510.DWG
DIRECTORY: 00108

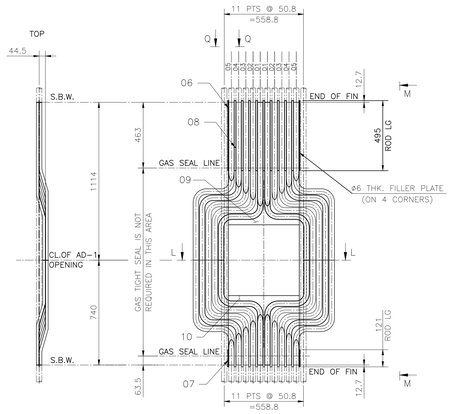
E-TENDER ENQUIRY NO.: PSER:PUR:BRH-S434:20 (ENQ:20:PP:0015:PUR:88) Date 05/03/2021.

CORPORATE DRG ID:TP-DG-0-06-751-01153/01

DRAWING NO. 0-06-751-01153

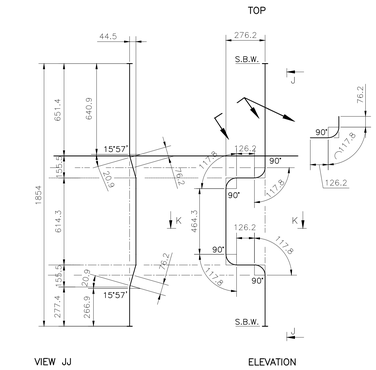
FOR TOLERANCES OF UNTOLERANCED DIMENSIONS DURING MANUFACTURE REFER PLANT STD. NO TP 023 0299

FOR TENDER PURPOSE ONLY



VIEW MM

ASSEMBLY OF AD-1 OPENING



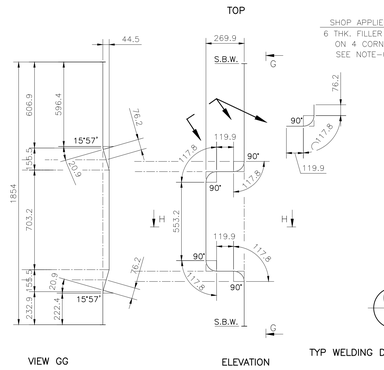
VIEW JJ

ELEVATION

DETAIL OF ITEM NO. 01



VIEW KK



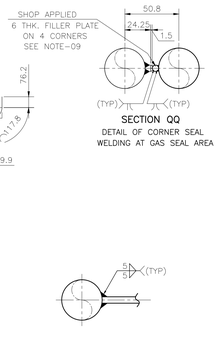
VIEW GG

ELEVATION

DETAIL OF ITEM NO. 02

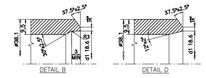


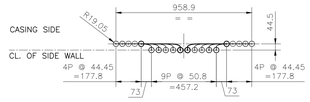
VIEW HH



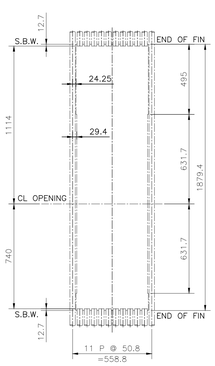
NOTES:

1. TOLERANCE UNLESS OTHERWISE SPECIFIED FRACTIONAL +1.5MM; ANGULAR +1°
2. ALL BEND RADII = 75. UNLESS OTHERWISE SPECIFIED.
3. ALL TUBULAR MATERIALS ARE OF ATTEST QUALITY.
4. CUT OUT AREAS SHOULD BE GROUND FLUSH WITH THE SURFACE OF THE TUBES, DO NOT UNDER CUT TUBES.
5. FOR INSERT TUBE END SCARFING DETAILS REFER ASSY DRAWINGS.
6. AT TERMINATION OF MEMBRANE STRIP WELDING MUST BE TURNED ROUND END OF STRIP.
7. FOR WELDING OF FIN SEE ARRGT. DRG NO. 0-06-751-01136, 0-06-751-01137, 0-06-751-01138 & 0-06-751-01140, 0-06-751-01141, 0-06-751-01142.
8. FOR DETAIL OF SHOP WELDED ATTACHMENT, SEE REF. DRG. NO. 0-06-751-01144.
9. DESIGN ,MANUFACTURING & INSPECTION AS PER IBR.
10. DESIGN PRESSURE : 287.2 KG/CM^2.
11. DESIGN TEMP : 498°C.
12. FOR EDGE PREPARTION REFER DETAIL B/D(d1=18.6)

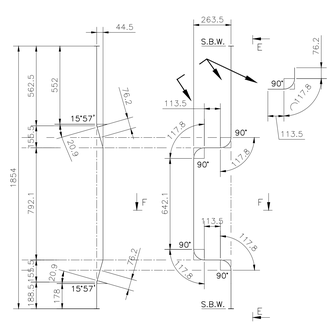




SECTION LL



DETAIL OF PANEL CUT OUT



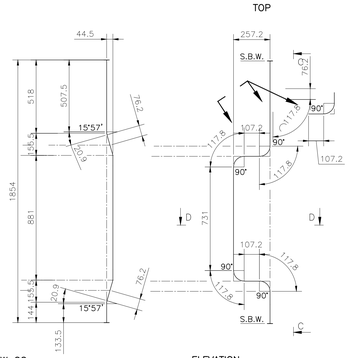
VIEW EE

ELEVATION

DETAIL OF ITEM NO. 03



VIEW FF



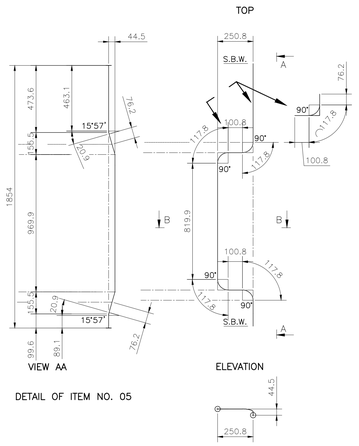
VIEW CC

ELEVATION

DETAIL OF ITEM NO. 04



VIEW DD



VIEW AA

ELEVATION

DETAIL OF ITEM NO. 05

VIEW BB

	10	SHAPED PLATE 6 THK	1-06-751-01245		15 942 277	C		7.270	
				10	SA387GR12CL2			1	
	09	SHAPED PLATE 6 THK	1-06-751-01245		15 942 277	C		6.590	
				09	SA387GR12CL2			1	
	08	SHAPED PLATE 6 THK	1-06-751-01245		15 942 277	C		0.300	
				08	SA387GR12CL2			9	
	07	PLATE 6x8x121 LONG	1-06-751-01245		15 942 277	C		0.026	
				07	SA387GR12CL2			2	
	06	PLATE 6x8x495 LONG	1-06-751-01245		15 942 277	C		0.108	
				06	SA387GR12CL2			2	
	05	TUBE D38.1x9.5 2302.4 LONG			15 489 225	A		16.100	
					SA 213 T22			2	
	04	TUBE D38.1x9.5 2270.7 LONG			15 489 225	A		16.000	
					SA 213 T22			2	
	03	TUBE D38.1x9.5 2264.5 LONG			15 489 225	A		16.000	
					SA 213 T22			2	
	02	TUBE D38.1x9.5 2277.2 LONG			15 489 225	A		16.000	
					SA 213 T22			2	
	01	TUBE D38.1x9.5 2289.9 LONG			15 489 225	A		16.000	
					SA 213 T22			2	
		OPENING FOR AD-1						177.026	
DRAWING NUMBER / ITEM NUMBER		DESCRIPTION	STD	DRAWING NUMBER	ITEM NO	MATERIAL CODE	A/C/R	UNIT	UNIT WEIGHT
					VAR NO	MATERIAL SPECN		QT	QUANTITY

CAUTION: The information on this document is the property of BHARAT HEAVY ELECTRICALS LTD. It must not be used directly or indirectly in any way detrimental to the interest of the company.

TYPE OF PRODUCT OR NAME OF CUSTOMER/PROJECT: BARH 660MW CUST NO:1701

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

	NAME	SIGNATURE	DATE
DRN	G.GLYTON		16.12.2010
CHD	R.B		17.12.2010
APPD	R.B		17.12.2010

DEPT PP | CODE 121 | 355-052 | ALL DIMENSIONS ARE IN MM | PROJECTION | SCALE N.T.S | WEIGHT (Kg) ---- | REF TO ASSY / OLD DWG D0801M0105-0330/01

TITLE: ASSY. & DETAILS OF AD-1 OPENING FOR FURNACE UPPER INT. SIDE FIN WELDED PANEL (CIRCUIT NO. F-19UI)

DRAWING NO : 0-06-751-01153 | REV 01

REV	DATE	ALTERED : THAMIZH
01	19.08.2019	CHD & APPD : AK DIXIT
ZONE		EDGE PREPARATION DETAILS ADDED & NOTES REVISED.

CORPORATE DRG ID:TP-DG-0-06-751-01153/01

E-TENDER ENQUIRY NO.: PSER:PUR:BRH-S434:20 (ENQ:20:PP:0015:PUR:88) Date 05/03/2021.

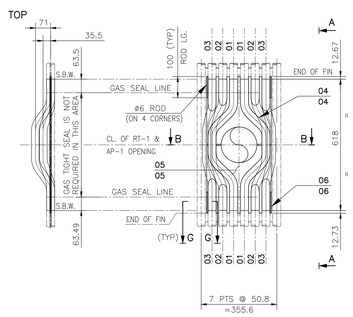
CORPORATE DRG ID:TP-DG-0-06-751-01156/01

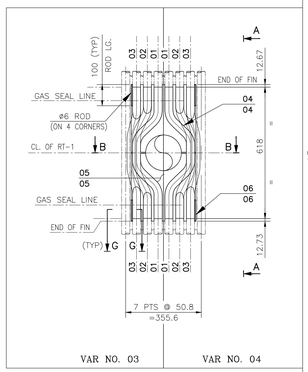
DRAWING NO: 0-06-751-01156

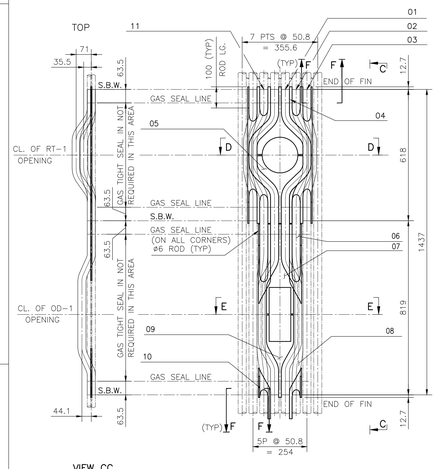
FOR TOLERANCES OF UNTOLERANCED DIMENSIONS DURING MANUFACTURE REFER PLANT STD. NO TP 023 0299

NOTES:

1. TOLERANCE UNLESS OTHERWISE SPECIFIED FRACTIONAL +1.5MM; ANGULAR +1°
2. ALL BEND RADII = 75. UNLESS OTHERWISE SPECIFIED.
3. ALL TUBULAR MATERIALS ARE OF ATTEST QUALITY.
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5. FOR INSERT TUBE END SCARFING DETAILS REFER ASSY DRAWINGS.
6. AT TERMINATION OF MEMBRANE STRIP WELDING MUST BE TURNED ROUND END OF STRIP.
7. FOR WELDING OF FIN SEE ARRGT. DRG NO. 0-06-751-01136, 0-06-751-01137, 0-06-751-01138 & 0-06-751-01140, 0-06-751-01141, 0-06-751-01142.
8. FOR DETAILS OF SHAPED PLATE SEE DRG NO. 1-06-751-01247.
9. FOR DETAIL OF SHOP WELDED ATTACHMENT, SEE REF. DRG. NO. 0-06-751-01144.
10. DESIGN ,MANUFACTURING & INSPECTION AS PER IBR.
11. DESIGN PRESSURE : 287.2 KG/CM^2.
12. DESIGN TEMP : 498°C.
13. FOR EDGE PREPARTION REFER DETAIL B/D(d1=18.6)





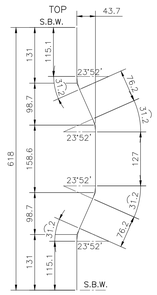


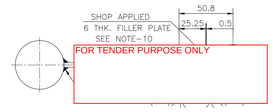
VAR NO. 01

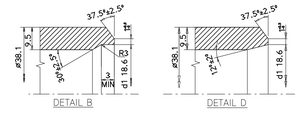
ASSEMBLY OF RT-1 & AP-1

VAR NO. 02

ASSEMBLY OF RT-1,OD-1 COMBO OPENING

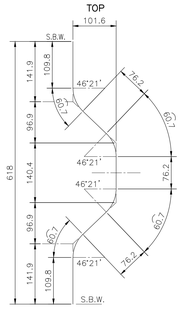


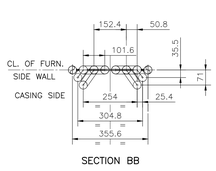


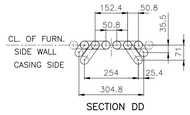


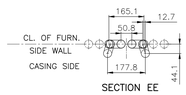
06	PLATE 6x8x100 LG	1-06-751-01247		15 942 277	C			0.022
			06	SA387GR12CL2				2
05	SHAPED PLATE 6 THK	1-06-751-01247		15 942 277	C			0.490
			05	SA387GR12CL2				1
04	SHAPED PLATE 6 THK	1-06-751-01247		15 942 277	C			0.490
			04	SA387GR12CL2				2
03	TUBE D38.1x9.5 634.4 LONG			15 489 225	A			4.400
				SA 213 T22				1
02	TUBE D38.1x9.5 673.8 LONG			15 489 225	A			4.700
				SA 213 T22				1
01	TUBE D38.1x9.5 691 LONG			15 489 225	A			4.800
				SA 213 T22				1
04	OPENING FOR RT-1							15.414
06	PLATE 6x8x100 LG	1-06-751-01247		15 942 277	C			0.022
			06	SA387GR12CL2				2
05	SHAPED PLATE 6 THK	1-06-751-01247		15 942 277	C			0.490
			05	SA387GR12CL2				1
04	SHAPED PLATE 6 THK	1-06-751-01247		15 942 277	C			0.490
			04	SA387GR12CL2				2
03	TUBE D38.1x9.5 634.4 LONG			15 489 225	A			4.400
				SA 213 T22				1
02	TUBE D38.1x9.5 673.8 LONG			15 489 225	A			4.700
				SA 213 T22				1
01	TUBE D38.1x9.5 691 LONG			15 489 225	A			4.800
				SA 213 T22				1
03	OPENING FOR RT-1							15.414
11	TUBE D38.1x9.5 1509.9 LONG			15 489 225	A			10.600
				SA 213 T22				1
10	PLATE 6x8x100 LG	1-06-751-01247		15 942 277	C			0.022
			10	SA387GR12CL2				8
09	SHAPED PLATE 6 THK	1-06-751-01247		15 942 277	C			0.650
			09	SA387GR12CL2				1
08	SHAPED PLATE 6 THK	1-06-751-01247		15 942 277	C			0.240
			08	SA387GR12CL2				2
07	SHAPED PLATE 6 THK	1-06-751-01247		15 942 277	C			0.730
			07	SA387GR12CL2				1
06	SHAPED PLATE 6 THK	1-06-751-01247		15 942 277	C			0.360
			12	SA387GR12CL2				2
05	SHAPED PLATE 6 THK	1-06-751-01247		15 942 277	C			0.730
			11	SA387GR12CL2				2
04	SHAPED PLATE 6 THK	1-06-751-01247		15 942 277	C			0.490
			04	SA387GR12CL2				4
03	TUBE D38.1x9.5 634.5 LONG			15 489 225	A			4.400
				SA 213 T22				2
02	TUBE D38.1x9.5 1509.9 LONG			15 489 225	A			10.600
				SA 213 T22				1
01	TUBE D38.1x9.5 1536 LONG			15 489 225	A			10.800
				SA 213 T22				2
02	COMBO OPENING FOR RT-1 & OD-1							57.976
06	PLATE 6x8x100 LG	1-06-751-01247		15 942 277	C			0.022
			06	SA387GR12CL2				4
05	SHAPED PLATE 6 THK	1-06-751-01247		15 942 277	C			0.490
			05	SA387GR12CL2				2
04	SHAPED PLATE 6 THK	1-06-751-01247		15 942 277	C			0.490
			04	SA387GR12CL2				4
03	TUBE D38.1x9.5 634.4 LONG			15 489 225	A			4.400
				SA 213 T22				2
02	TUBE D38.1x9.5 673.8 LONG			15 489 225	A			4.700
				SA 213 T22				2
01	TUBE D38.1x9.5 691 LONG			15 489 225	A			4.800
				SA 213 T22				2
01	OPENING FOR RT-1 & AP-1							30.828

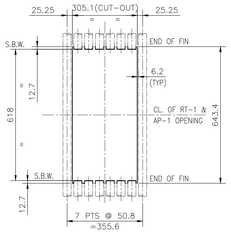
VARIANT NUMBER	ITEM NUMBER	DESCRIPTION	STD.	DRAWING NUMBER	ITEM NO	MATERIAL CODE	A/P/B	UNIT	UNIT WEIGHT	GS	ZONE
					VAR NO	MATERIAL SPECN		DI	QUANTITY		

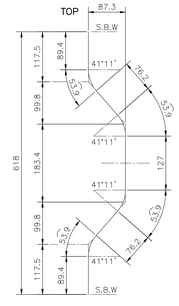


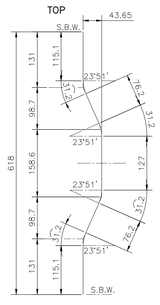


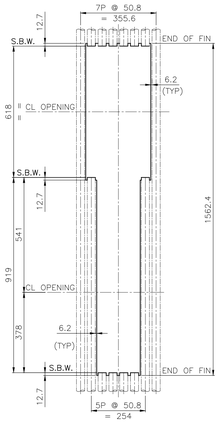


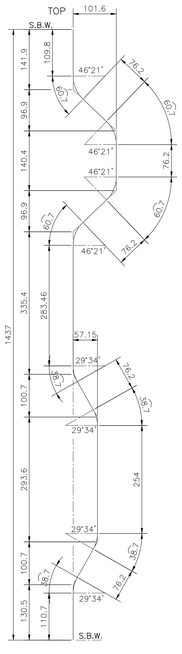


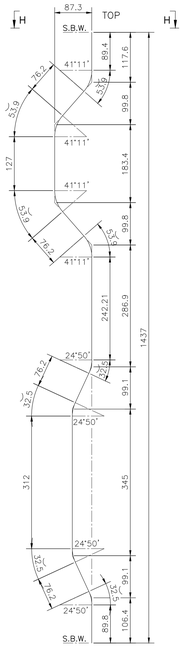


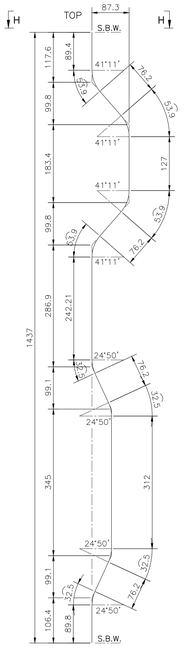


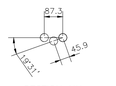














REV	DATE	ALTERED : THAMIZH
01	19.08.2019	CHD & APPD : AK DIXIT
ZONE		EDGE PREPARATION DETAILS ADDED & NOTES REVISED.

CAUTION: The information on this drawing is the property of BHARAT HEAVY ELECTRICALS LTD. It must not be used directly or indirectly in any way detrimental to the interest of the company.

TYPE OF PRODUCT OR NAME OF CUSTOMER/PROJECT: BARH 660MW CUST NO:1701

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

	NAME	SIGNATURE	DATE
DRN	G.GLYTON		16.12.2010
CHD	R.B		17.12.2010
APPD	R.B		17.12.2010

DEPT PP | ALL DIMENSIONS ARE IN MM | PROJECTION | SCALE N.T.S | WEIGHT (Kg) ---- | REF TO ASSY / OLD DWG D0801M0105-0334/02

CODE 121

TITLE: ASSEMBLY & DETAILS OF AP-1, RT-1 & RT-1, OD-1 COMBO OPENINGS (CIRCUIT NO. F-19UI)

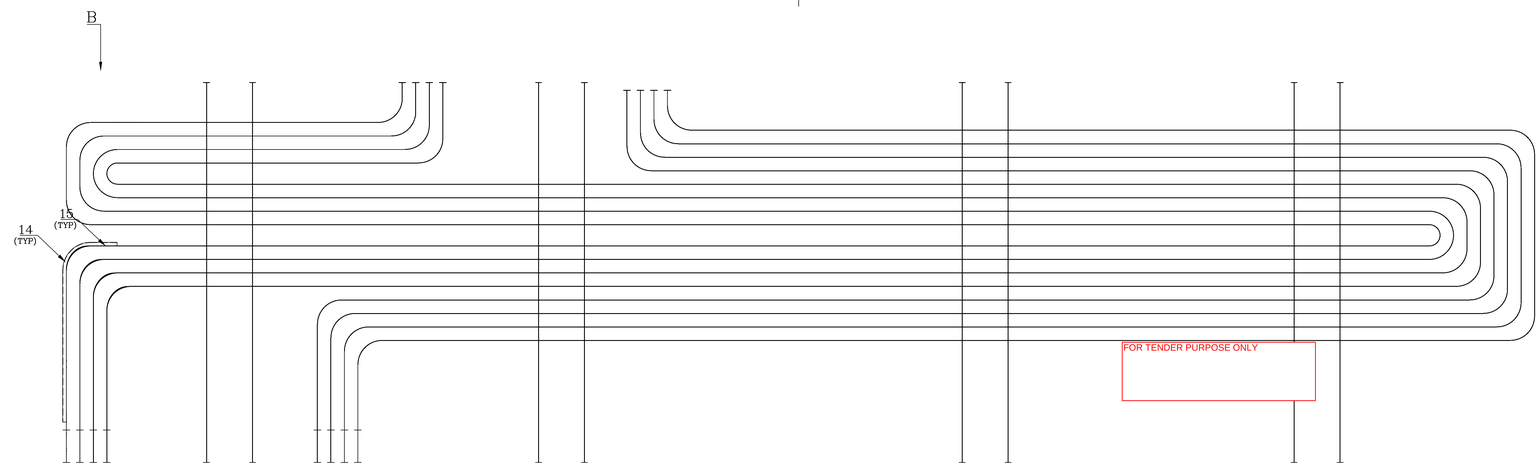
DRAWING NO: 0-06-751-01156 | REV 01

E-TENDER ENQUIRY NO.: PSER:PUR:BRH-S434:20 (ENQ:20:PP:0015:PUR:88) Date 05/03/2021.

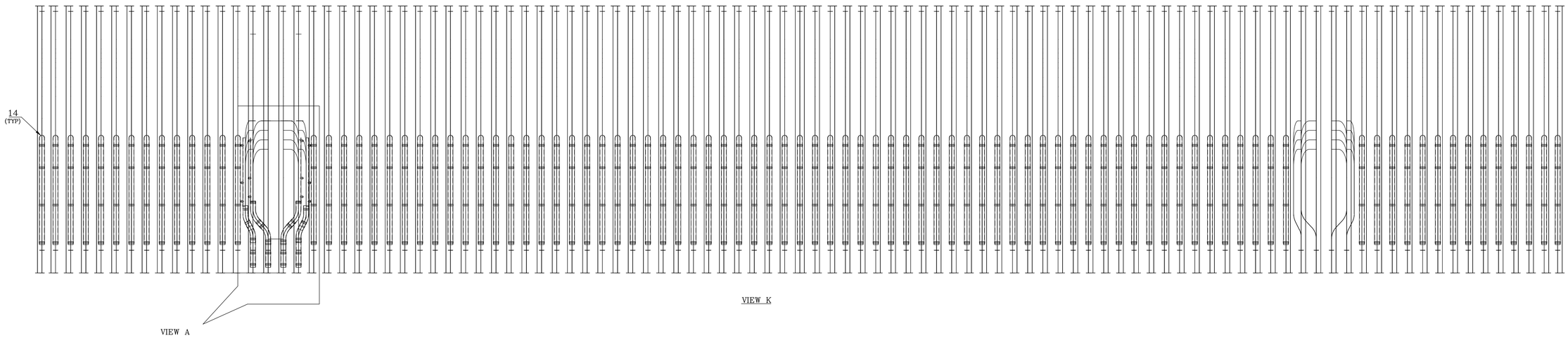
CORPORATE DRG ID:TP-DG-0-16-270-02725/00

DRAWING NO. 0-16-270-02725

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

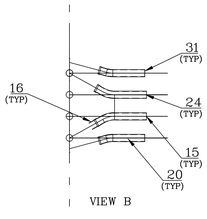


ARRANGEMENT OF PROTECTION SHIELD ON LTRH
(MARK NO R-04)

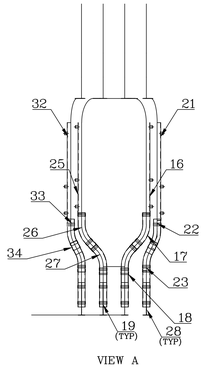


VIEW K

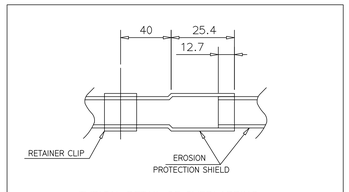
VIEW A



VIEW B

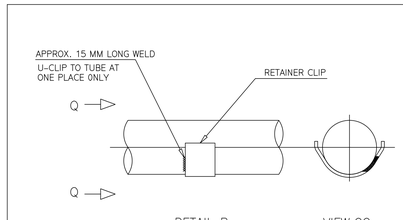


VIEW A

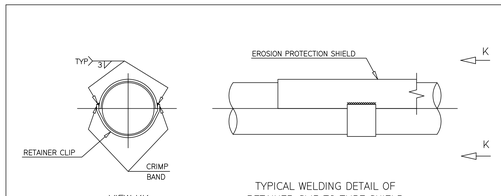


TYPICAL DETAIL OF OVERLAPPING OF ONE PROTECTION SHIELD OVER OTHER PROTECTION SHIELD

DETAIL-X



DETAIL-P VIEW QQ



VIEW KK

TYPICAL WELDING DETAIL OF RETAINER CLIP TO TUBE SHIELD

NOTE:

1.–FOR DETAILS OF ITEMS REFER DWG NO 0–16–270–02724 .

EROSION SHIELD WELDING NOTES

1. THE BOTTOM RETAINER CLIPS (TO HOLD THE TOP SHIELDS) TO BE PLACED IN POSITION AT A PITCH OF MAX. 500 MM. ONE RETAINER CLIP IS TO BE PLACED AT BOTH ENDS OF THE TUBE SHIELD AT A DISTANCE OF 40 MM FROM ENDS.
2. ONE OF THE RETAINER CLIP PER TUBE SHIELD PREFERABLY AT THE CENTER CAN BE WELDED WITH THE TUBE AS PER DETAIL-P AT ONE PLACE ONLY TO AVOID ROTATION OF TUBE SHIELD.
3. RETAINER CLIP QUANTITY INDICATED IN THE BOM ARE TENTATIVE.

REV	DATE	ALTERED :
01		CHD & APPD :
ZONE		

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TYPE OF PRODUCT OR NAME OF CUSTOMER/PROJECT

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

	NAME	SIGNATURE	DATE
DRN	ANEET DIXIT		22.10.18
CHD	ANEET DIXIT		22.10.18
APPD	SAK		22.10.18

DEPT	ALL DIMENSIONS ARE IN MM	PROJECTION	SCALE	WEIGHT (Kg)
355–052 PP			NTS	----------
CODE 121				

REF TO ASSY / OLD DWG

TITLE: ARRANGEMENT OF PROTECTION SHIELD ON LTRH (MARK NO R-04)

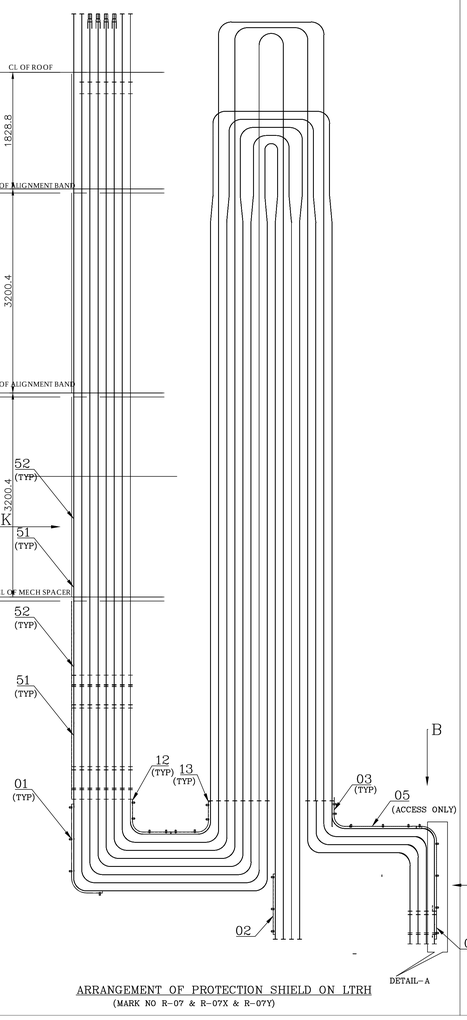
DRAWING NO : 0–16–270–02725 | REV 00

E-TENDER ENQUIRY NO.: PSER:PUR:BRH-S434:20 (ENQ:20:PP:0015:PUR:88) Date 05/03/2021.

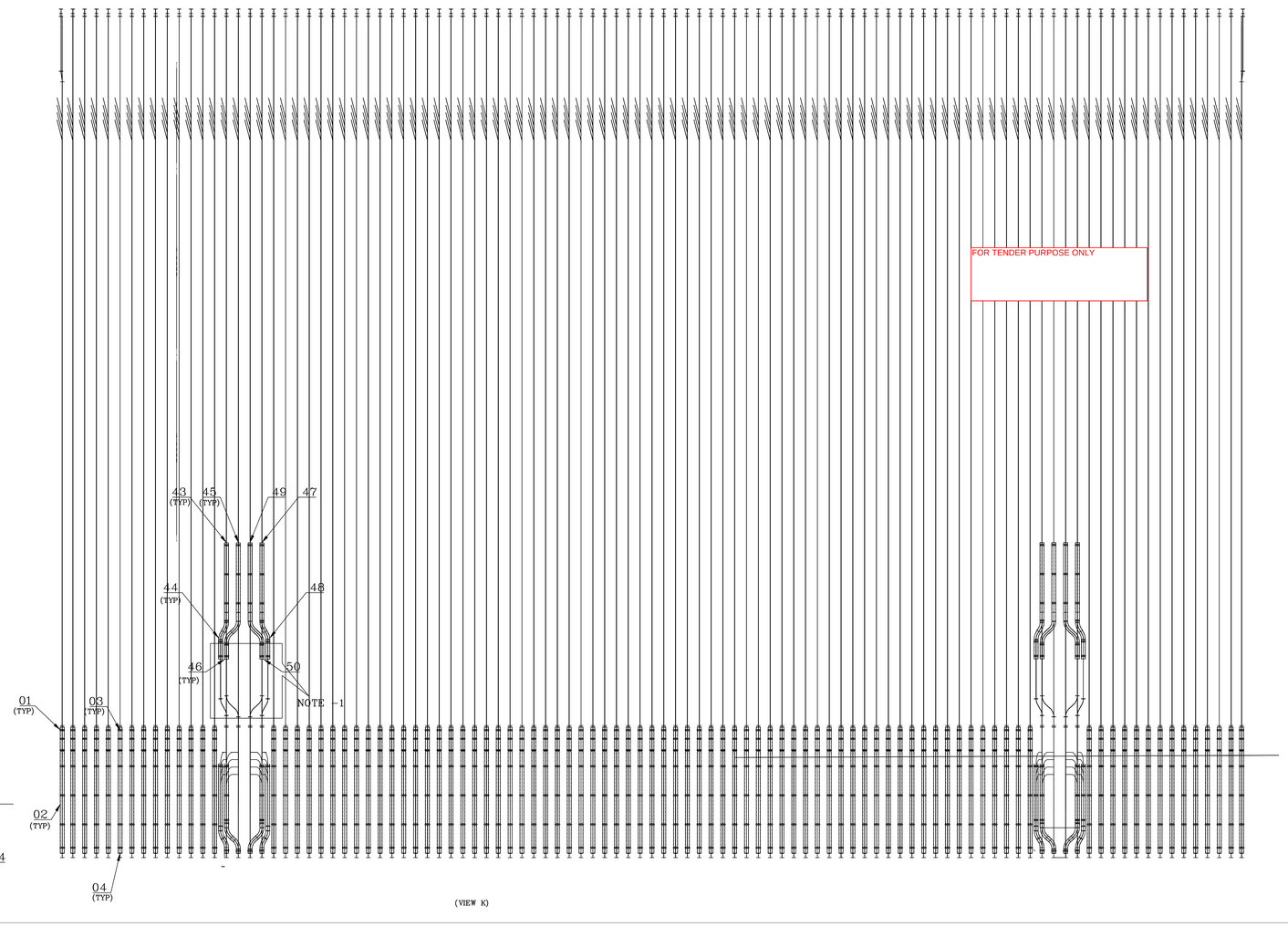
CORPORATE DRG ID:TP-DG-0-16-270-02727/00

DRAWING NO. 0-16-270-02727

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

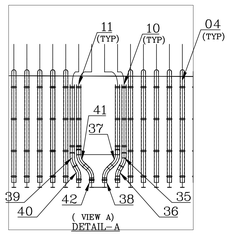


ARRANGEMENT OF PROTECTION SHIELD ON LTRH
(MARK NO R-07 & R-07X & R-07Y)

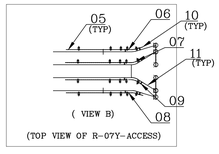


(VIEW K)

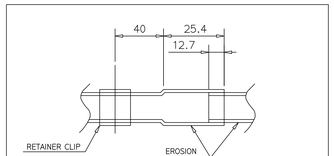
FOR TENDER PURPOSE ONLY



(VIEW A)
DETAIL-A

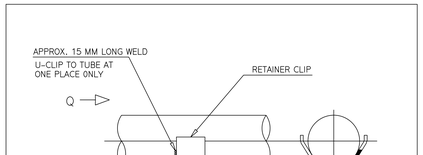


(VIEW B)
(TOP VIEW OF R-07Y-ACCESS)

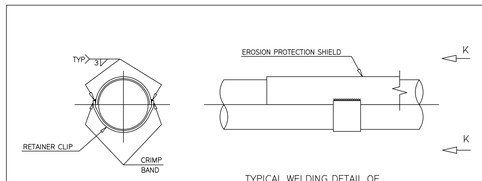


TYPICAL DETAIL OF OVERLAPPING
OF ONE PROTECTION SHIELD
OVER OTHER PROTECTION SHIELD

DETAIL-X



DETAIL-P VIEW QQ



VIEW KK

TYPICAL WELDING DETAIL OF
RETAINER CLIP TO TUBE SHIELD

NOTE:

1.-FOR DETAILS OF ITEMS REFER DWG NO 0-16-270-02724 & 1-16-270-01955 .

EROSION SHIELD WELDING NOTES

1. THE BOTTOM RETAINER CLIPS (TO HOLD THE TOP SHIELDS) TO BE PLACED IN POSITION AT A PITCH OF MAX. 500 MM. ONE RETAINER CLIP IS TO BE PLACED AT BOTH ENDS OF THE TUBE SHIELD AT A DISTANCE OF 40 MM FROM ENDS.
2. ONE OF THE RETAINER CLIP PER TUBE SHIELD PREFERABLY AT THE CENTER CAN BE WELDED WITH THE TUBE AS PER DETAIL-P AT ONE PLACE ONLY TO AVOID ROTATION OF TUBE SHIELD.
3. RETAINER CLIP QUANTITY INDICATED IN THE BOM ARE TENTATIVE.

REV	DATE	ALTERED :
01		CHD & APPD :
ZONE		

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TYPE OF PRODUCT
OR NAME OF
CUSTOMER/PROJECT

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

	NAME	SIGNATURE	DATE
DRN	ANEET DIXIT		22.10.18
CHD	ANEET DIXIT		22.10.18
APPD	SAK		22.10.18

355-052

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

TITLE
ARRANGEMENT OF PROTECTION SHIELD ON LTRH
(MARK NO R-07 & R-07X & R-07Y)

DRAWING NO : 0-16-270-02727 REV 00

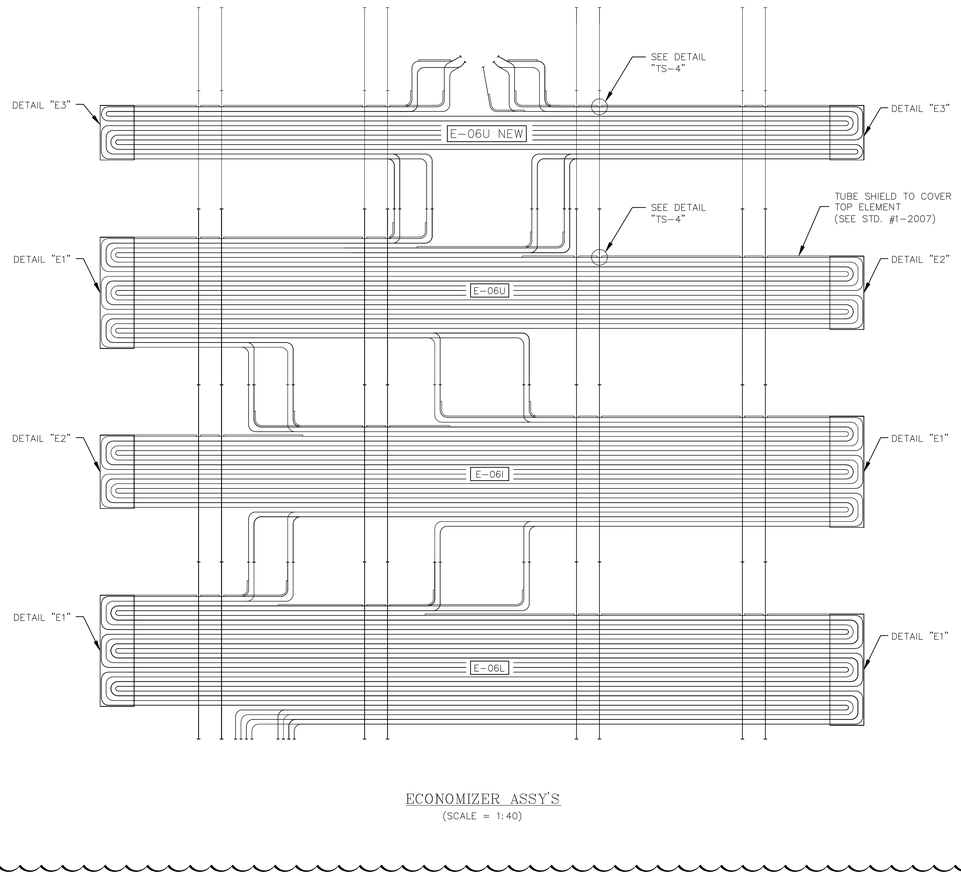
CORPORATE DRG ID:TP-DG-0-16-270-02727/00

E-TENDER ENQUIRY NO.: PSER:PUR:BRH-S434:20 (ENQ:20:PP:0015:PUR:88) Date 05/03/2021.

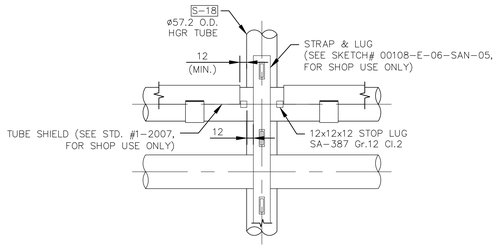
CORPORATE DRG ID:TP-DG-0-17-909-00684/00

DRAWING NO. 0-17-909-00684

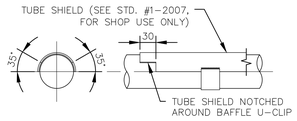
FOR TOLERANCES OF UNTOLERANCED DIMENSIONS DURING MANUFACTURE REFER TOLERANCE NO. BHEL TP 023 0299



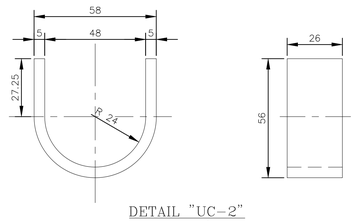
ECONOMIZER ASSY'S
(SCALE = 1:40)



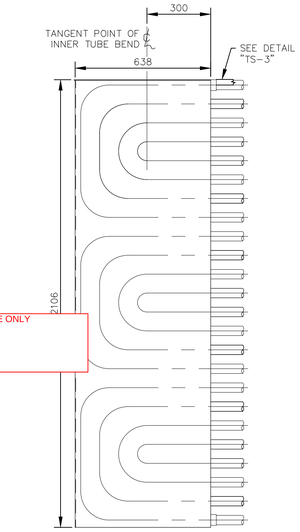
DETAIL "TS-4"
TYP. TOP OF ALL ECON ASS'Y (AS SHOWN)
(G-6)



DETAIL "TS-3"
TYP. TOP TUBE OF ALL ECON ASS'Y (AS SHOWN)
(H-1) (H-2) (E-2)

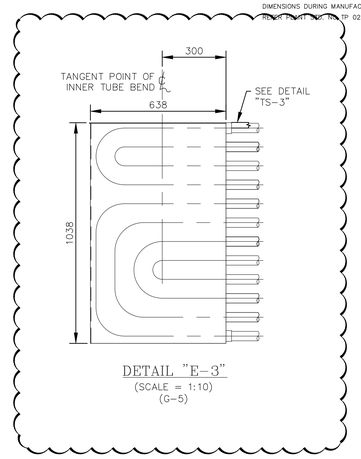


DETAIL "UC-2"
5mm THK MAT'L #35
(SCALE = 1:1)
(C-7)

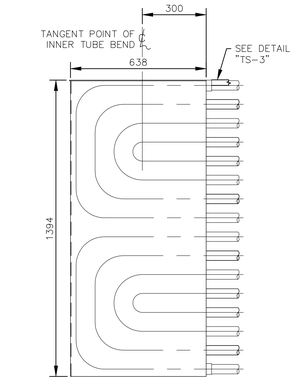


DETAIL "E-1"
(SCALE = 1:10)
(F-5)

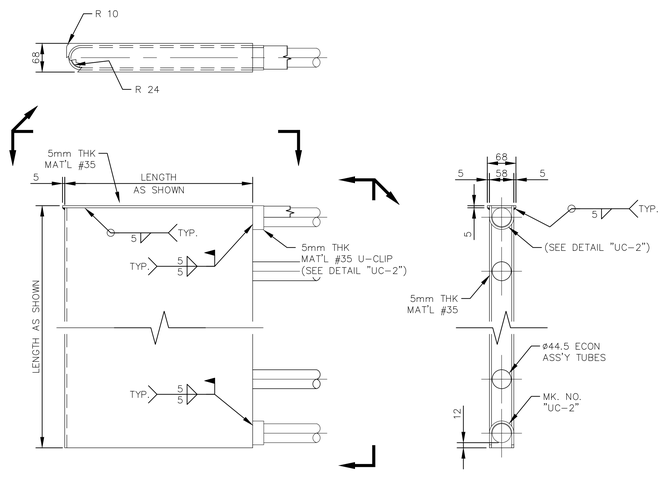
FOR TENDER PURPOSE ONLY



DETAIL "E-3"
(SCALE = 1:10)
(G-5)



DETAIL "E-2"
(SCALE = 1:10)
(G-5)



GENERAL CONSTRUCTION DETAILS
SHOWN WITHOUT PUFF TIE
(SCALE = 1:5)

MATERIAL SPECIFICATION CHART

MAT'L ITEM NO.	ASME SPEC.	PURCH. INST.
35	SA-240 GR.304 18CR 8NI	P8F3

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TYPE OF PRODUCT OR NAME OF CUSTOMER/PROJECT

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

	NAME	SIGNATURE	DATE
DRN	NANDHINI		16.10.18
CHD	AK DIXIT		16.10.18
APPD	SAK		17.10.18

355-052

REV	DATE	ALTERED :
01		CHD & APPD :

ZONE

DEPT: PP | CODE: 121 | ALL DIMENSIONS ARE IN MM | PROJECTION | SCALE: NTS | WEIGHT (Kg): --- | REF TO ASSY / OLD DWG: 00108-1E0180

TITLE: ECON CASSETTE BAFFLE ARRG'T

DRAWING NO : 0-17-909-00684 | REV: 00

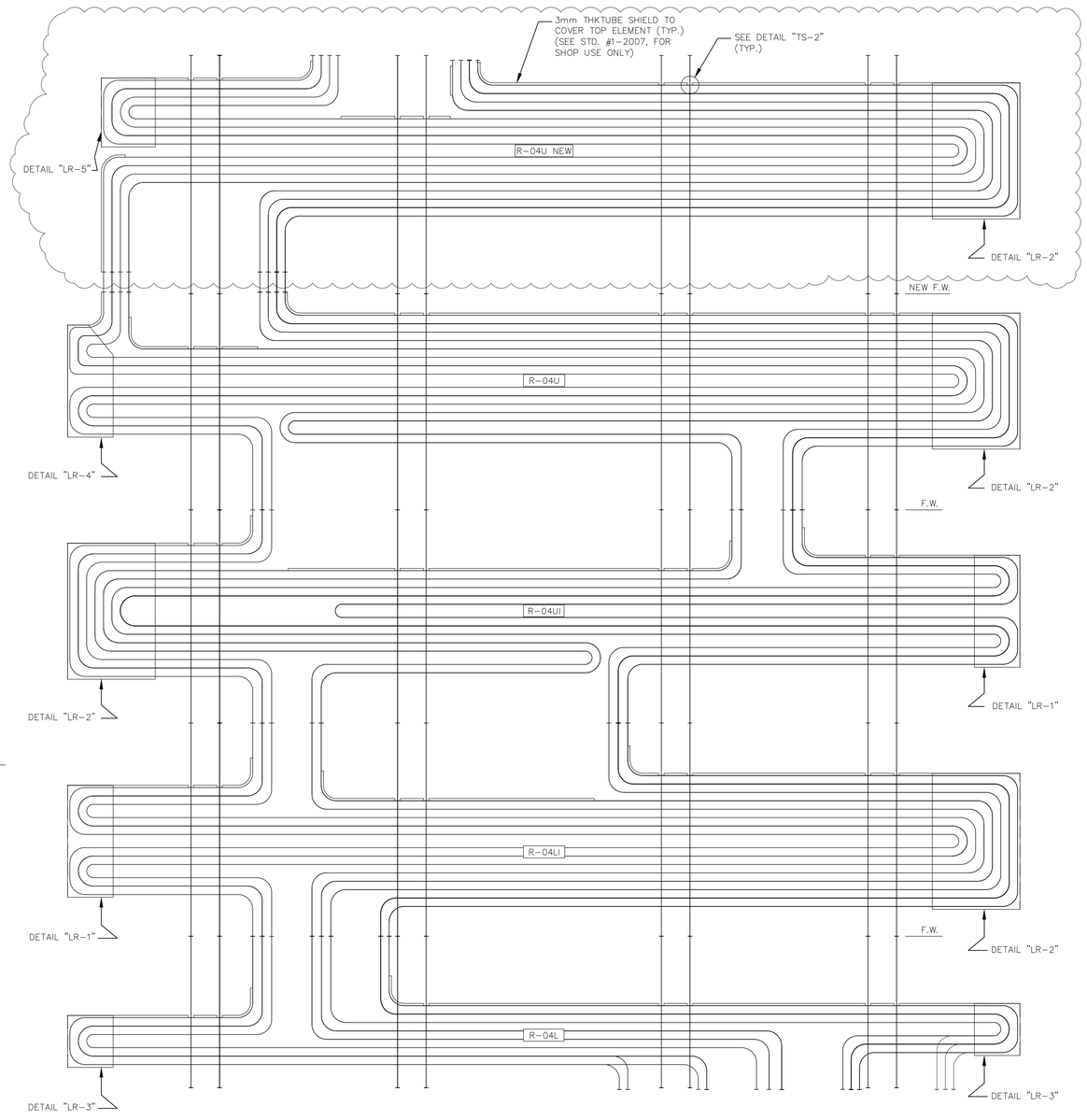
CORPORATE DRG ID:TP-DG-0-17-909-00684/00

E-TENDER ENQUIRY NO.: PSER:PUR:BRH-S434:20 (ENQ:20:PP:0015:PUR:88) Date 05/03/2021.

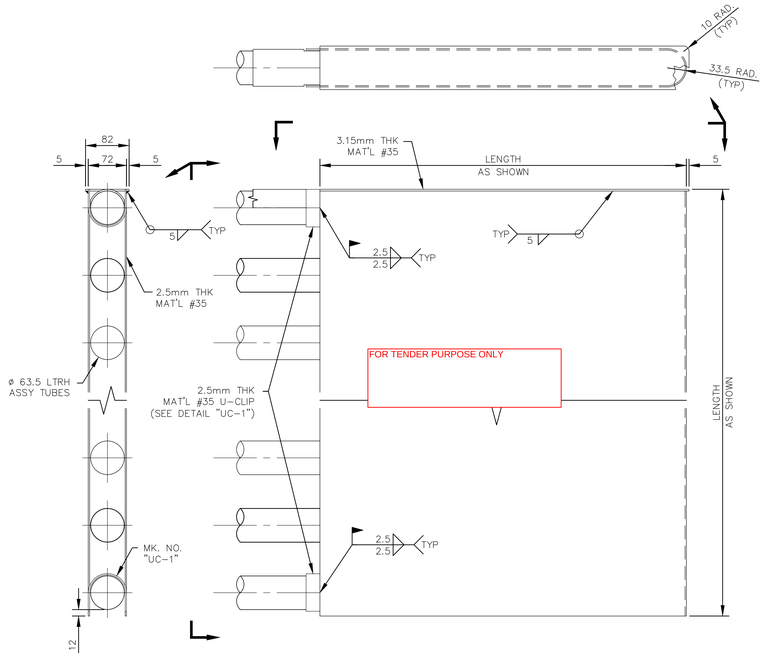
CORPORATE DRG ID:TP-DG-0-17-909-00685/00

DRAWING NO. 0-17-909-00685

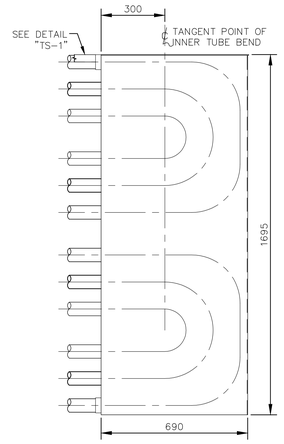
FOR TOLERANCES OF UNTOLERANCED DIMENSIONS DURING MANUFACTURE REFER PLANT STD. NO TP 023 0299



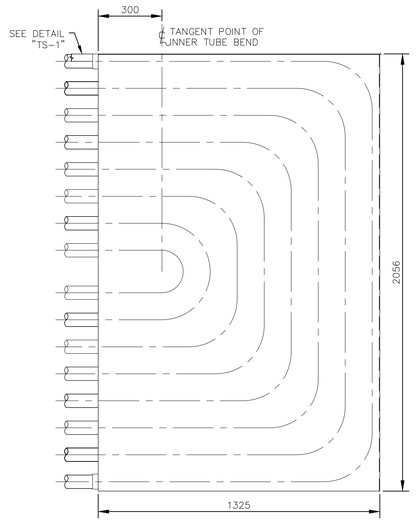
LTRH SIDE ELEVATION
(SCALE = 1:30)



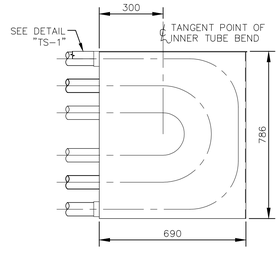
GENERAL CONSTRUCTION DETAILS
(SCALE = 1:4)



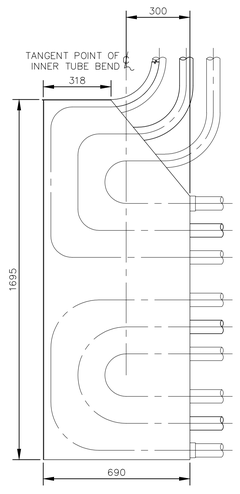
DETAIL "LR-1"
(SCALE = 1:10)
(D-8) (E-5)



DETAIL "LR-2"
(SCALE = 1:10)
(D-5) (E-8) (F-5) (G-5)



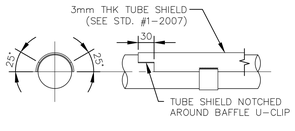
DETAIL "LR-3"
(SCALE = 1:10)
(C-5) (C-8)



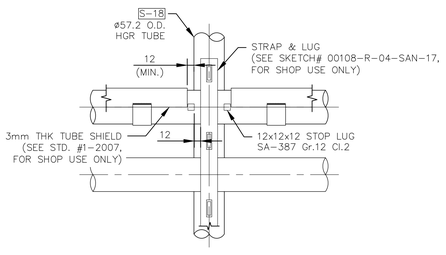
DETAIL "LR-4"
(SCALE = 1:10)
(F-8)

REFERENCE DRAWINGS:

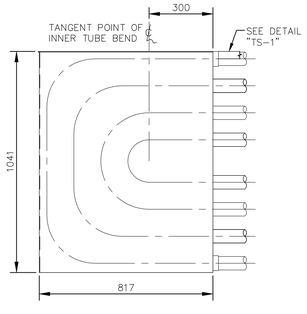
1. P.P.A.-COMPOSITE SECTIONAL SIDE ---------- 00108-1E0100



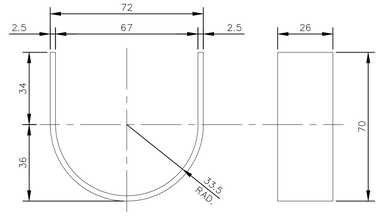
DETAIL "TS-1"
TYP. TOP TUBE OF ALL LTRH ASS'Y (AS SHOWN)
(H-2) (E-4) (D-3) (B-5)



DETAIL "TS-2"
TYP. TOP OF ALL LTRH ASS'Y (AS SHOWN)
(H-6)



DETAIL "LR-5"
(SCALE = 1:10)
(H-8)



DETAIL "UC-1"
2.5mm THK MAT'L #35
(SCALE = 1:1)
(F-4)

MATERIAL SPECIFICATION CHART

MAT'L ITEM NO.	ASME SPEC.	PURCH. INST.
35	SA-240 GR.304 18CR 8NI	P8F3

REV	DATE	ALTERED :
01		CHD & APPD :
ZONE		

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TYPE OF PRODUCT OR NAME OF CUSTOMER/PROJECT

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

	NAME	SIGNATURE	DATE
DRN	NANDHINI		16.10.18
CHD	AK DIXIT		16.10.18
APPD	SAK		17.10.18

355-052

DEPT PP | ALL DIMENSIONS ARE IN MM | PROJECTION | SCALE NTS | WEIGHT (Kg) --- | REF TO ASSY / OLD DWG 00108-1E0181

CODE 121

TITLE: LTRH CASSETTE BAFFLE ARRG'T

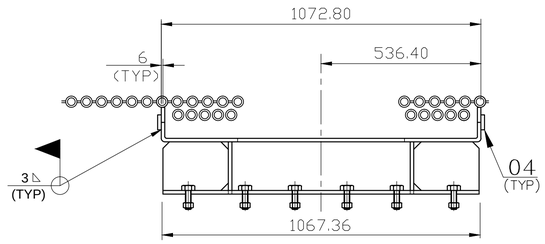
DRAWING NO : 0-17-909-00685 | REV 00

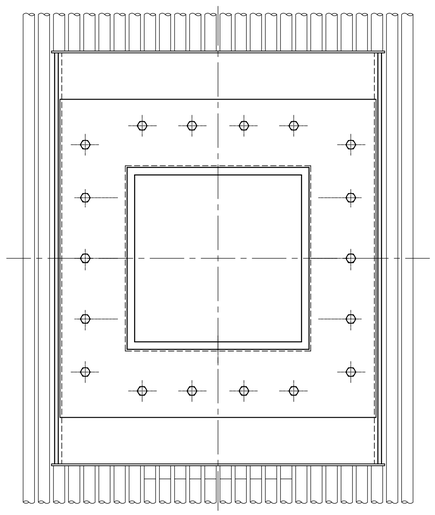
CORPORATE DRG ID:TP-DG-0-17-909-00685/00

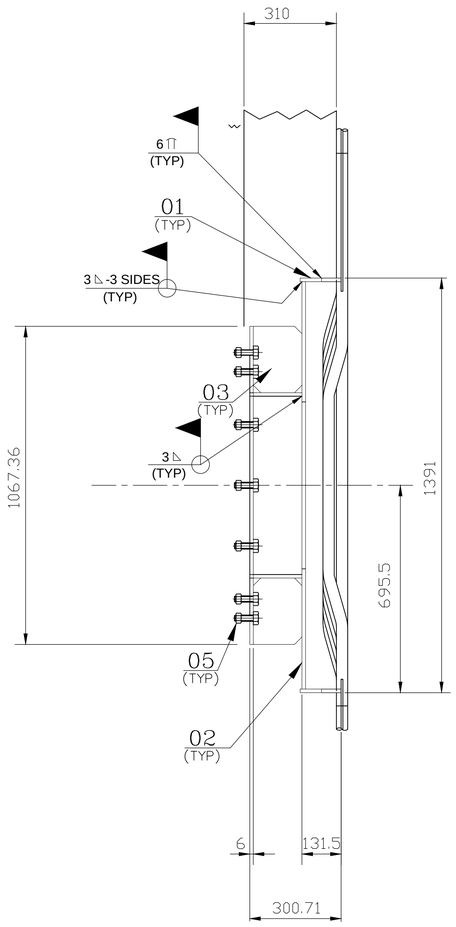
E-TENDER ENQUIRY NO.: PSER:PUR:BRH-S434:20 (ENQ:20:PP:0015:PUR:88) Date 05/03/2021.

DRAWING NO: 1-09-001-00396

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







NOTES:

1. ALL WELDS ARE TO BE SEAL WELDED GAS TIGHT UNLESS OTHERWISE SPECIFIED.
2. ERECTOR TO CUT CORNER OF SCALLOPPED BAR SO AS TO PROVIDE A CLEARANCE BETWEEN ADJACENT TUBE AND A COMPLETE SEAL WELD AROUND THE EDGE OF SEAL BOX.
3. SEAL BOX IS TO BE FILLED WITH CASTABLE REFACTORY. (REFER DRG NO: 3-09-002-00194)
4. PAINT THE SURFACE OF ALL TUBES THAT ARE EMBEDED IN CASTABLE REFRACTORY WITH TWO COATS OF BITUMASTIC PAINT.

FOR TENDER PURPOSE ONLY

VARIANT NUMBER	ITEM NUMBER	DESCRIPTION	STD	DRAWING NUMBER	ITEM NO / VAR NO	MATERIAL CODE / MATERIAL SPECN	A/C/P	UNIT / DI	UNIT WEIGHT / QUANTITY	GS	ZONE
	05	HEX NUT M20				413040002000			0.070		
								L	18		
	04	PL 6;50x1379				15042277	C		3.250		
						SA387GR12CL2		L	2		
	03	MOUNTING PLATE		1-09-001-00397					70.252		
						WELDMENT		L	1		
	02	SEAL BOX		3-09-001-00532		15042277			61.900		
						SA387GR12CL2	C	L	1		
	01	PL 6;75x1117.6				15042277			3.950		
						SA387GR12CL2	C	L	2		

REV	DATE	ALTERED :
01		CHD & APPD :
ZONE		

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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	R.MANI		16.02.11
CHD	R.MURALI		18.02.11
APPD	R.MURALI		19.02.11

DEPT PP
CODE 121
ALL DIMENSIONS ARE IN MM
PROJECTION
SCALE NTS
WEIGHT (Kg) 147.812
REF TO ASSY / OLD DWG

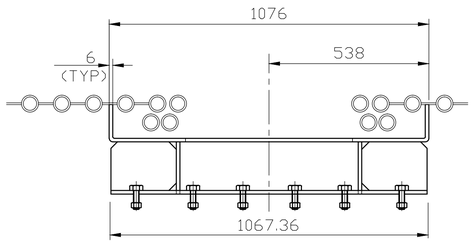
TITLE: SEAL BOX FOR ACCESS DOOR OPENING (AD-1)

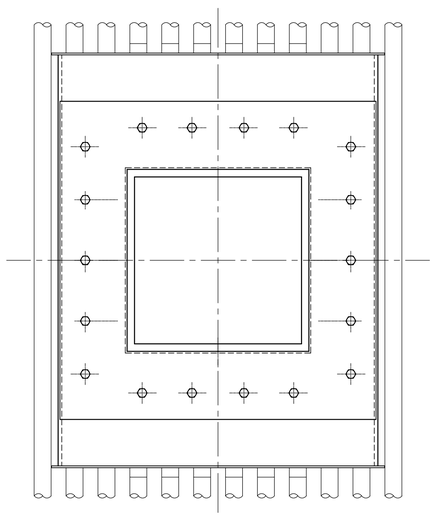
DRAWING NO : 1-09-001-00396
REV 00

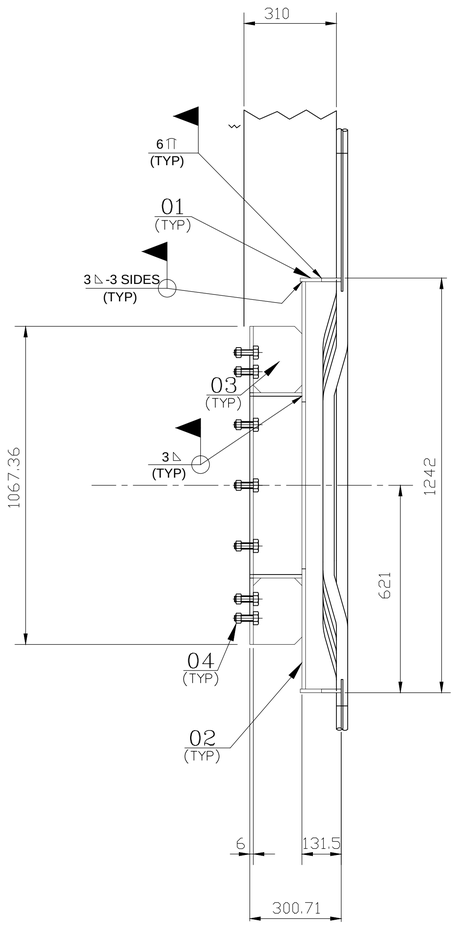
E-TENDER ENQUIRY NO.: PSER:PUR:BRH-S434:20 (ENQ:20:PP:0015:PUR:88) Date 05/03/2021.

DRAWING NO: 1-09-001-00400

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







NOTES:

1. ALL WELDS ARE TO BE SEAL WELDED GAS TIGHT UNLESS OTHERWISE SPECIFIED.
2. ERECTOR TO CUT CORNER OF SCALLOPPED BAR SO AS TO PROVIDE A CLEARANCE BETWEEN ADJACENT TUBE AND A COMPLETE SEAL WELD AROUND THE EDGE OF SEAL BOX.
3. SEAL BOX IS TO BE FILLED WITH CASTABLE REFACTORY. (REFER DRG NO: 3-09-002-00194)
4. PAINT THE SURFACE OF ALL TUBES THAT ARE EMBEDED IN CASTABLE REFRACTORY WITH TWO COATS OF BITUMASTIC PAINT.

FOR TENDER PURPOSE ONLY

VARIANT NUMBER	ITEM NUMBER	DESCRIPTION	STD	DRAWING NUMBER	ITEM NO / VAR NO	MATERIAL CODE / MATERIAL SPECN	A/C/P	UNIT / DI	UNIT WEIGHT / QUANTITY	GS	ZONE
	04	HEX NUT M20				413040002000			0.070		
								L	18		
	03	MOUNTING PLATE		1-09-001-00397					70.252		
						WELDMENT		L	1		
	02	SEAL BOX		3-09-001-00534		15042277			63.000		
						SA387GR12CL2	C	L	1		
	01	PL 6;70x1088				15042277			3.600		
						SA387GR12CL2	C	L	2		

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TYPE OF PRODUCT OR NAME OF CUSTOMER/PROJECT

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

	NAME	SIGNATURE	DATE
DRN	R.MANI		16.02.11
CHD	R.MURALI		18.02.11
APPD	R.MURALI		19.02.11

355-053

DEPT PP | CODE 121 | ALL DIMENSIONS ARE IN MM | PROJECTION | SCALE NTS | WEIGHT (Kg) 141.712 | REF TO ASSY / OLD DWG

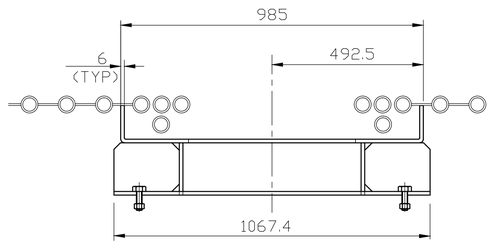
TITLE: SEAL BOX FOR ACCESS DOOR OPENING (AD-3)

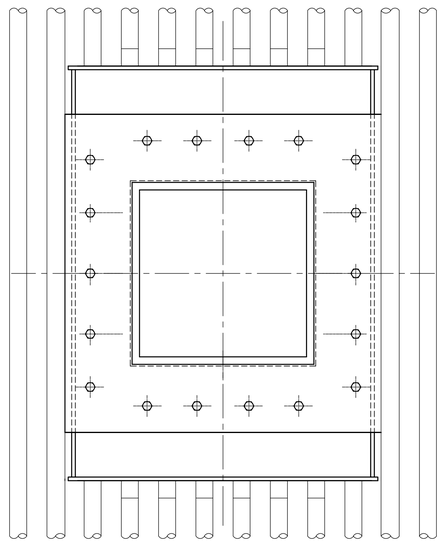
DRAWING NO: 1-09-001-00400 | REV 00

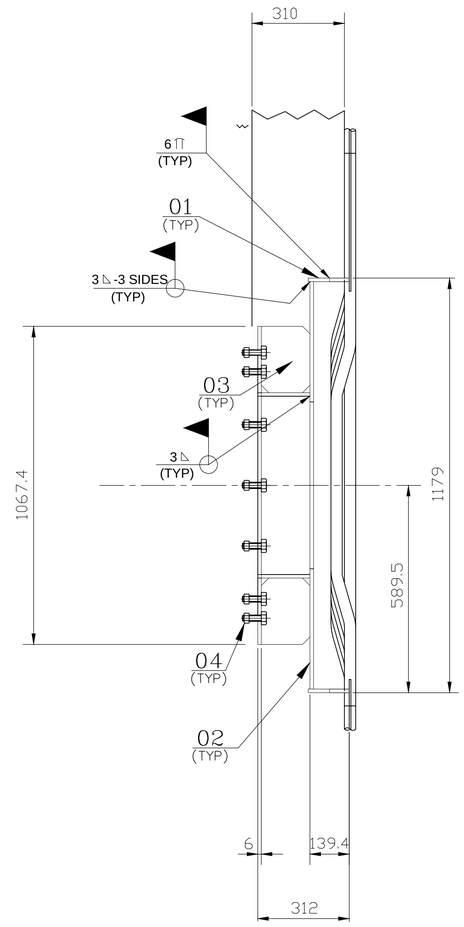
REV	DATE	ALTERED :
01		CHD & APPD :
ZONE		

DRAWING NO: 1-09-001-00403

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







NOTES:

1. ALL WELDS ARE TO BE SEAL WELDED GAS TIGHT UNLESS OTHERWISE SPECIFIED.
2. ERECTOR TO CUT CORNER OF SCALLOPPED BAR SO AS TO PROVIDE A CLEARANCE BETWEEN ADJACENT TUBE AND A COMPLETE SEAL WELD AROUND THE EDGE OF SEAL BOX.
3. SEAL BOX IS TO BE FILLED WITH CASTABLE REFACTORY. (REFER DRG NO: 3-09-002-00194)
4. PAINT THE SURFACE OF ALL TUBES THAT ARE EMBEDED IN CASTABLE REFRACTORY WITH TWO COATS OF BITUMASTIC PAINT.

FOR TENDER PURPOSE ONLY

VARIANT NUMBER	ITEM NUMBER	DESCRIPTION	STD	DRAWING NUMBER									ZONE
					ITEM NO	MATERIAL CODE			UNIT	UNIT WEIGHT			
					VAR NO	MATERIAL SPECN	A/C/P		DI	QUANTITY		GS	
	04	HEX NUT M20				413040002000				0.070			
									L	18			
	03	MOUNTING PLATE		1-09-001-00397						70.252			
						WELDMENT			L	1			
	02	SEAL BOX		3-09-001-00536		15042277				53.420			
						SA387GR12CL2	C		L	1			
	01	PL 6;70x997				15042277				3.300			
						SA387GR12CL2	C		L	2			

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TYPE OF PRODUCT OR NAME OF CUSTOMER/PROJECT

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

	NAME	SIGNATURE	DATE
DRN	R.MANI		16.02.11
CHD	R.MURALI		18.02.11
APPD	R.MURALI		19.02.11

355-053

REV	DATE	ALTERED :
01		CHD & APPD :
ZONE		

DEPT PP | CODE 121 | ALL DIMENSIONS ARE IN MM | PROJECTION | SCALE NTS | WEIGHT (Kg) 131.532 | REF TO ASSY / OLD DWG

TITLE: SEAL BOX ASSY FOR ACCESS DOOR OPENING (AD-5)

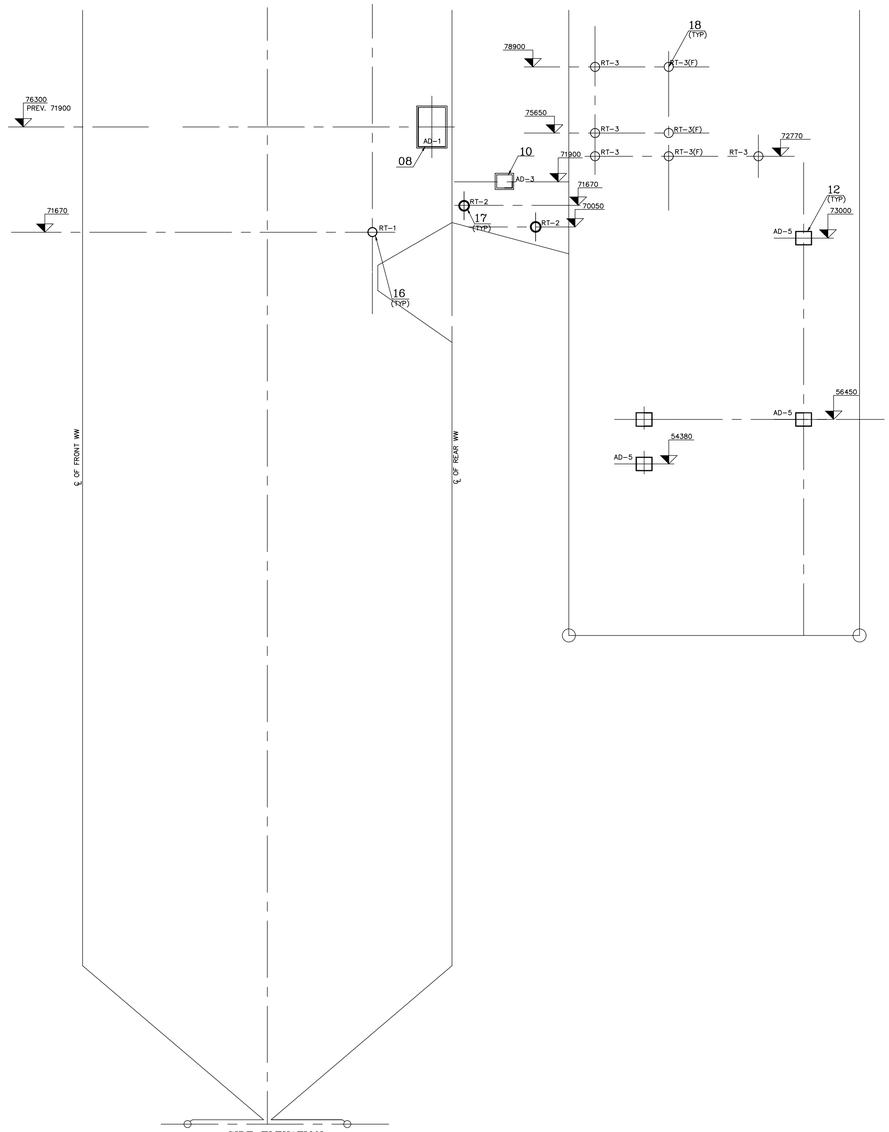
DRAWING NO : 1-09-001-00403 | REV 00

E-TENDER ENQUIRY NO.: PSER:PUR:BRH-S434:20 (ENQ:20:PP:0015:PUR:88) Date 05/03/2021.

CORPORATE DRG ID:TP-DG-1-09-001-00850/00

DRAWING NO: 1-09-001-00850

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



SIDE ELEVATION

NOTES:

01. OPENINGS SHOWN ON SIDE ELEVATION ARE IN BOTH SIDES UNLESS OTHERWISE SPECIFIED.
02. SEALBOXES CAN BE SUITABLY MODIFIED AT SITE IN CASE OF ANY INTERFERENCE.
03. SEALBOXES ARE RELEASED SLIGHTLY IN EXCESS FOR ANY LOSS DURING TRANSIT.
06. ITEM No:19 & 20 ARE RELEASED AS CUT TO SIZE PLATES FOR ADHOC MANUFACTURING AT SITE IN CASE OF LEFT OUT OPENINGS. SAME PLATE CAN BE USED FOR CLOSING OF EXISTING SEAL BOXES OF LRSB.

FOR TENDER PURPOSE ONLY

VARIANT NUMBER	ITEM NUMBER	DESCRIPTION	STD	DRAWING NUMBER			A/C/P			GS	ZONE
					ITEM NO	MATERIAL CODE		UNIT	UNIT WEIGHT		
					VAR NO	MATERIAL SPECN		DI	QUANTITY		
	20	PLATE 6X2000x1500				150110370000	C		140.04		
						SA182F12CL2		L	1		
	19	PLATE 6X2000x1500				150422770000	C		140.40		
						SA182F12CL2		L	2		
	18	SEALBOX ASSY FOR SOOT BLOWER OPENING (RT-3)		2-09-001-01042					29.980		
						WELDMENT		L	14		
	17	SEALBOX ASSY FOR SOOT BLOWER OPENING (RT-2)		2-09-001-01041					27.680		
						WELDMENT		L	4		
	16	SEALBOX ASSY FOR SOOT BLOWER OPENING (RT-1)		2-09-001-01040					31.310		
						WELDMENT		L	2		
	12	SEALBOX FOR ACCESS DOOR OPENING(AD-5)		1-09-001-00403					131.532		
						WELDMENT		L	8		
	10	SEALBOX FOR ACCESS DOOR OPENING(AD-3)		1-09-001-00400					141.712		
						WELDMENT		L	2		
	08	SEALBOX FOR ACCESS DOOR OPENING(AD-1)		1-09-001-00396					147.812		
						WELDMENT		L	2		

REV	DATE	ALTERED :
01		CHD & APPD :
ZONE		

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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	AK DIXIT		11.01.19
CHD	AK DIXIT		11.01.19
APPD	SAK		11.01.19

DEPT	ALL DIMENSIONS ARE IN MM	PROJECTION	SCALE	WEIGHT (Kg)	REF TO ASSY / OLD DWG
PP			N.T.S	----	
CODE 121					

TITLE: LOCATION OF SEAL BOXES FOR OPENING

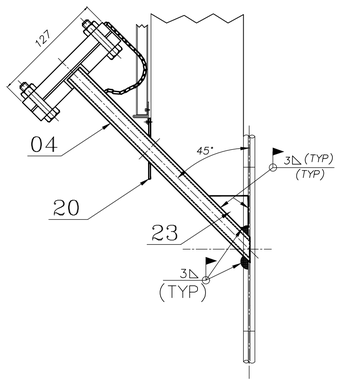
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E-TENDER ENQUIRY NO.: PSER:PUR:BRH-S434:20 (ENQ:20:PP:0015:PUR:88) Date 05/03/2021.

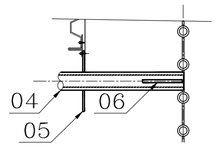
CORPORATE DRG ID:TP-DG-1-09-002-00849/00

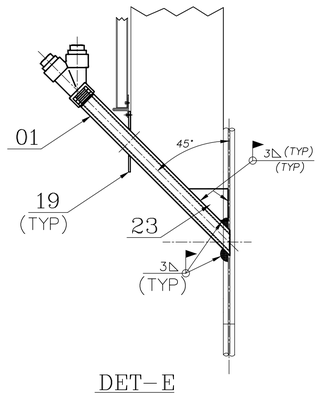
DRAWING NO. 1-09-002-00849

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

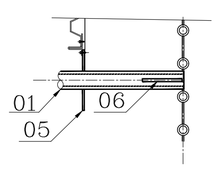


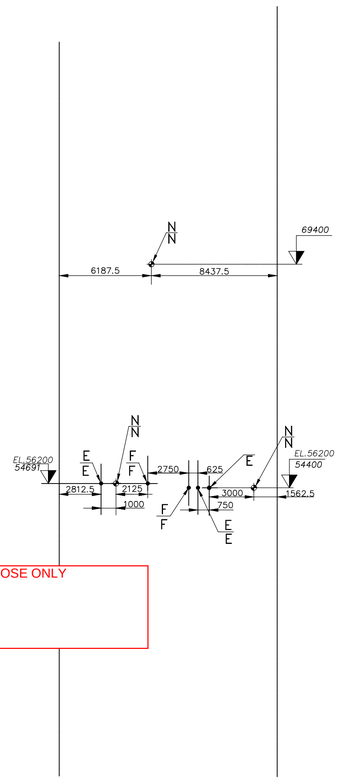
DET–N



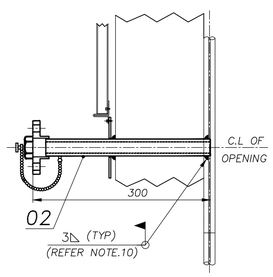


DET–E

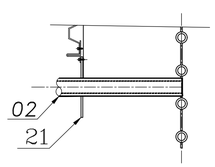




FOR TENDER PURPOSE ONLY



DET–F



NOTES:

01. A,B,C..etc MEANS DETAIL–A,DETAIL–B,DETAIL–C AND SO ON.
02. ITEM No.GIVEN IN THE TOP (L) LEFT SIDE ONLY AND THE BOTTOM (R) RIGHT SIDE ONLY, UNLESS OTHERWISE SPECIFIED.
03. OPENINGS ARE TO BE PROVIDED SUITABLY AT SITE IN SEAL BOXES AND PANEL FINS.
04. ALL WELDS ARE TO BE SEAL WELDED GAS TIGHT.
05. ERECTOR TO CUT THE CORNER OF SCALLOPED BAR SO AS TO PROVIDE A CLEARANCE BETWEEN ADJACENT TUBE AND COMPLETE SEAL WELD AROUND THE EDGE OF SEAL BOX.
06. SEAL BOX IS TO BE FILLED WITH CASTABLE REFRACTORY.
07. PAINT THE SURFACE OF ALL THE TUBES THAT ARE EMBEDDED IN CASTABLE REFRACTORY WITH TWO COATS OF BITUMASTIC PAINT.
08. SEAL BOXES MAY BE SUITABLY TRIMMED TO THE REQUIREMENT AT SITE IF THERE IS ANY INTERFERENCE.
10. WELDING HAS TO BE CARRIED OUT ON THE SKIN CASING ALSO.

TYPE OF WELD	TYPE OF ELECTRODE
3△(SITE)	E 7018
6⊓(SITE)	E 7018

VARIANT NUMBER	ITEM NUMBER	DESCRIPTION	STD	DRAWING NUMBER	ITEM NO / VAR NO	MATERIAL CODE / MATERIAL SPECN	A/C/P / DI	UNIT	UNIT WEIGHT / QUANTITY	GS	ZONE
	23	STIFFENER PLATE		4-09-002-00630		15 011 092			0.927		
						IS 2062FE410A		L	9		
	21	FACE PLATE		4-09-002-00633		15 011 092			1.800		
						IS 2062FE410A		L	4		
	20	FACE PLATE		4-09-002-00631		15 011 092			1.700		
						IS 2062FE410A		L	4		
	19	FACE PLATE		4-09-002-00632		15 011 092			1.770		
						IS 2062FE410A		L	5		
	04	ASLD TAPPING ASSEMBLY		3-09-002-00518					9.308		
						WELDMENT		L	4		
	02	TEMPERATURE TAPPING ASSEMBLY		3-09-002-00514					4.890		
						WELDMENT		L	4		
	01	PRESSURE TAPPING ASSEMBLY		3-09-002-00515					6.992		
						WELDMENT		L	5		

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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	AK DIXIT		11.01.19
CHD	AK DIXIT		11.01.19
APPD	SAK		11.01.19

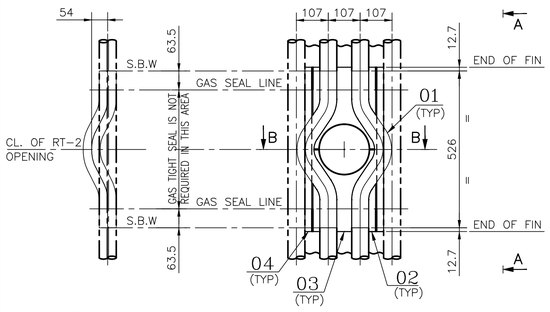
DEPT PP CODE 121 | ALL DIMENSIONS ARE IN MM | PROJECTION | SCALE NTS | WEIGHT (Kg) ---- | REF TO ASSY / OLD DWG

TITLE: LOCATION OF SEAL BOXES FOR INSTRUMENT INSERTS

DRAWING NO : 1-09-002-00849 | REV 00

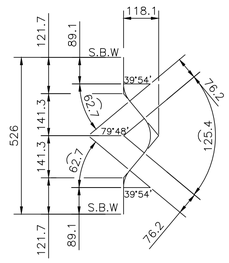
REV	DATE	ALTERED :
01		CHD & APPD :
ZONE		

DRAWING NO: 1-11-684-02850



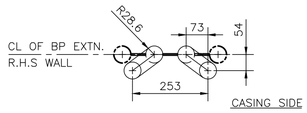
VIEW AA

ASSEMBLY OF RT-2 & AP-2 OPENING

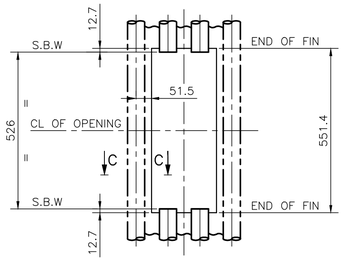


DETAIL OF ITEM NO-01

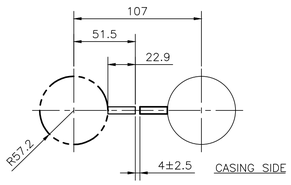
VAR. NO-01



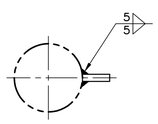
VIEW BB



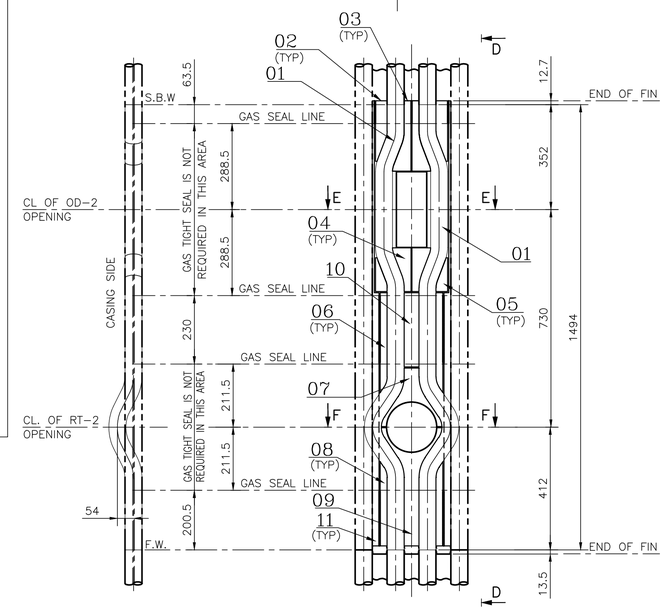
DETAIL OF PANEL CUT OUT



SECTION CC



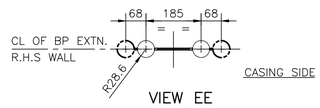
TYP WELDING DETAIL OF SHAPED PLATE



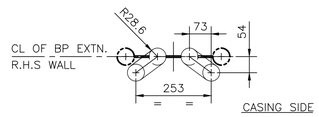
VIEW DD

ASSEMBLY OF OD-2_RT-2 COMBO OPENING

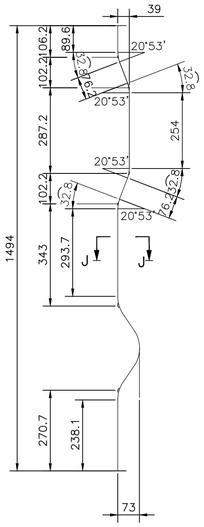
VAR. NO-02

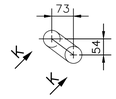


VIEW EE



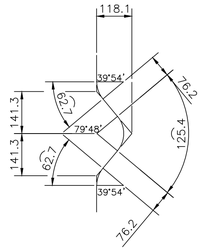
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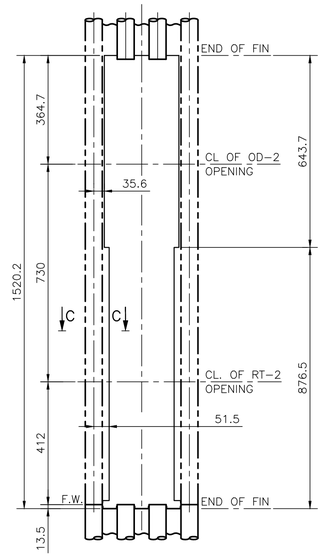


VIEW-JJ

DETAIL OF ITEM NO-01



VIEW KK



DETAIL OF PANEL CUT OUT

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

NOTES:

1. TOLERANCE UNLESS OTHERWISE SPECIFIED FRACTIONAL +1.5MM; ANGULAR +1°
2. ALL BEND RADII = 90
3. ALL TUBULAR MATERIALS ARE OF ATTEST QUALITY.
4. CUT OUT AREAS SHOULD BE GROUND FLUSH WITH THE SURFACE OF THE TUBES, DO NOT UNDER CUT TUBES.
5. FOR INSERT TUBE END SCARFING DETAILS REFER ASSY DRAWINGS.
6. FOR DESIGN PARAMETERS REFER ASSY. DRAWING.
7. AT TERMINATION OF MEMBRANE STRIP WELDING MUST BE TURNED ROUND END OF STRIP.
8. FOR WELDING OF FIN SEE ARRGT. DRG.NO 0-11-684-00808 & 0-11-684-00809
9. FOR SHAPED PLATE DETAILS SEE DRG.NO 1-11-684-02851

VARIANT NUMBER	ITEM NUMBER	DESCRIPTION	STD	DRAWING NUMBER			A/C/P	UNIT		GS ZONE
					ITEM NO	MATERIAL CODE		UNIT WEIGHT		
					VAR NO	MATERIAL SPECN		DI	QUANTITY	
	11	SHAPED PLATE 6 THK;		1-11-684-02851		150422770000	C		1.130	
					10	SA387Gr12CL2			1	
	10	SHAPED PLATE 6 THK;		1-11-684-02851		150422770000	C		0.600	
					09	SA387Gr12CL2			1	
	09	SHAPED PLATE 6 THK;		1-11-684-02851		150422770000	C		0.960	
					08	SA387Gr12CL2			1	
	08	SHAPED PLATE 6 THK;		1-11-684-02851		150422770000	C		0.290	
					07	SA387Gr12CL2			2	
	07	SHAPED PLATE 6 THK;		1-11-684-02851		150422770000	C		0.520	
					06	SA387Gr12CL2			1	
	06	SHAPED PLATE 6 THK;		1-11-684-02851		150422770000	C		0.350	
					05	SA387Gr12CL2			2	
	05	SHAPED PLATE 6 THK;		1-11-684-02851		150422770000	C		0.150	
					04	SA387Gr12CL2			2	
	04	SHAPED PLATE 6 THK;		1-11-684-02851		150422770000	C		0.300	
					03	SA387Gr12CL2			2	
	03	SHAPED PLATE 6 THK;		1-11-684-02851		150422770000	C		0.470	
					02	SA387Gr12CL2			2	
	02	SHAPED PLATE 6 THK;		1-11-684-02851		150422770000	C		0.300	
					01	SA387Gr12CL2			2	
	01	TUBE D57.2x7.6 1562.2 LONG				15 495 003	A		15.400	
						SA213 Gr T23			2	
	02	OPENING FOR OD-2 & RT-2 (COMBO OPENING)							37.730	
						ASSY				
	04	SHAPED PLATE 6 THK;		1-11-684-02851		150422770000	C		0.590	
					13	SA387Gr12CL2			2	
	03	SHAPED PLATE 6 THK;		1-11-684-02851		150422770000	C		0.670	
					12	SA387Gr12CL2			2	
	02	SHAPED PLATE 6 THK;		1-11-684-02851		150422770000	C		0.160	
					11	SA387Gr12CL2			4	
	01	TUBE D57.2x7.6 581.4 LONG				15 495 003	A		5.700	
						SA213 Gr T23			2	
	01	OPENING FOR RT-2 & AP-2							14.560	
						ASSY				

FOR TENDER PURPOSE ONLY

REV	DATE	ALTERED :
01		CHD & APPD :
ZONE		

CAUTION: The information on this document is the property of BHARAT HEAVY ELECTRICALS LIMITED & must not be used directly or indirectly in any way detrimental to the interest of the company.

TYPE OF PRODUCT OR NAME OF CUSTOMER/PROJECT: BARH 660MW CUST NO:1701

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

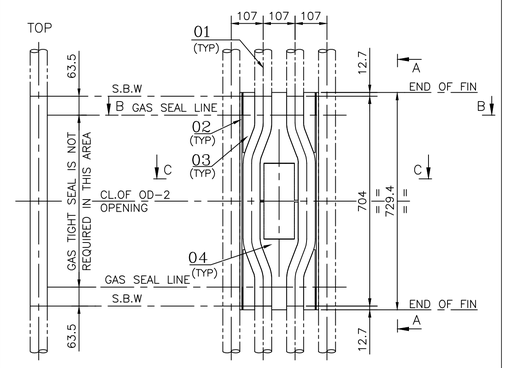
	NAME	SIGNATURE	DATE
DRN	S.RANJITH		14.09.2010
CHD	R.B		15.09.2010
APPD	R.B		15.09.2010

DEPT PP | CODE 121 | ALL DIMENSIONS ARE IN MM | PROJECTION | SCALE N.T.S | WEIGHT (Kg) ---- | REF TO ASSY / OLD DWG D0801M0105-0408/00

TITLE: ASSY & DETAIL OF RT-2, AP-2 & OD-2_RT-2 COMBO OPENINGS. (CIRCUIT NO. S-07)

DRAWING NO: 1-11-684-02850 | REV 00

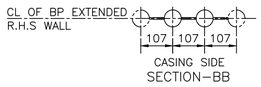
DRAWING NO: 1-11-684-02852

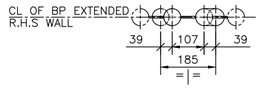


VIEW-AA

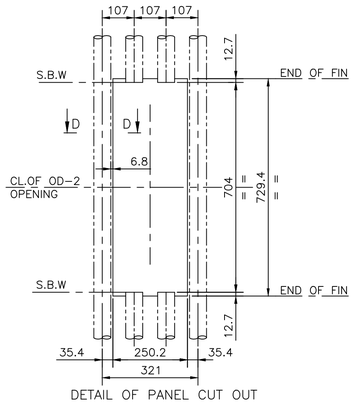
ASSEMBLY OF OD-2 OPENING

VAR.NO-01

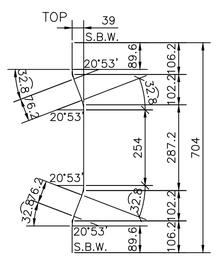




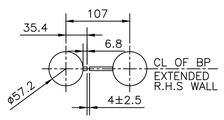
CASING SIDE
SECTION-CC

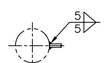


DETAIL OF PANEL CUT OUT

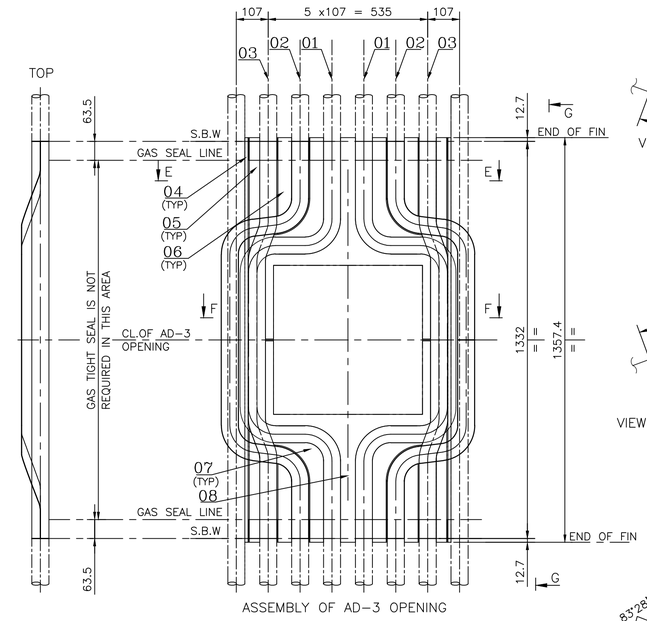


DETAIL OF ITEM NO. 01





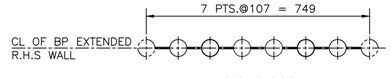
TYP WELDING DETAIL OF SHAPED PLATE

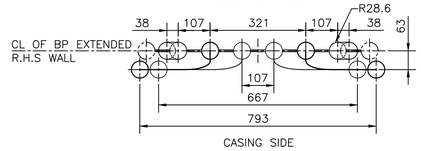


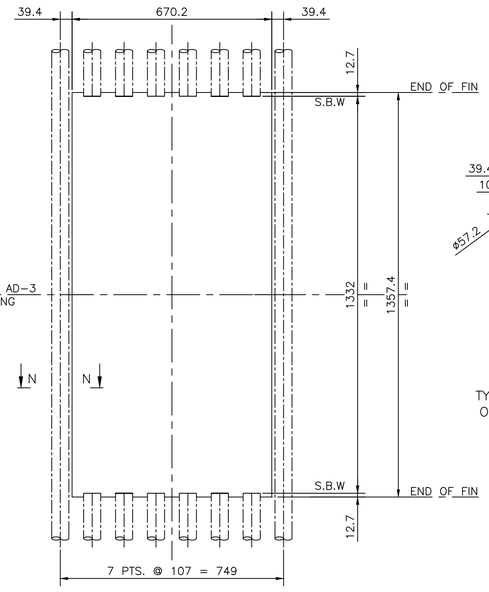
VIEW-GG

ASSEMBLY OF AD-3 OPENING

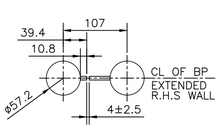
VAR.NO-02

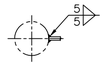




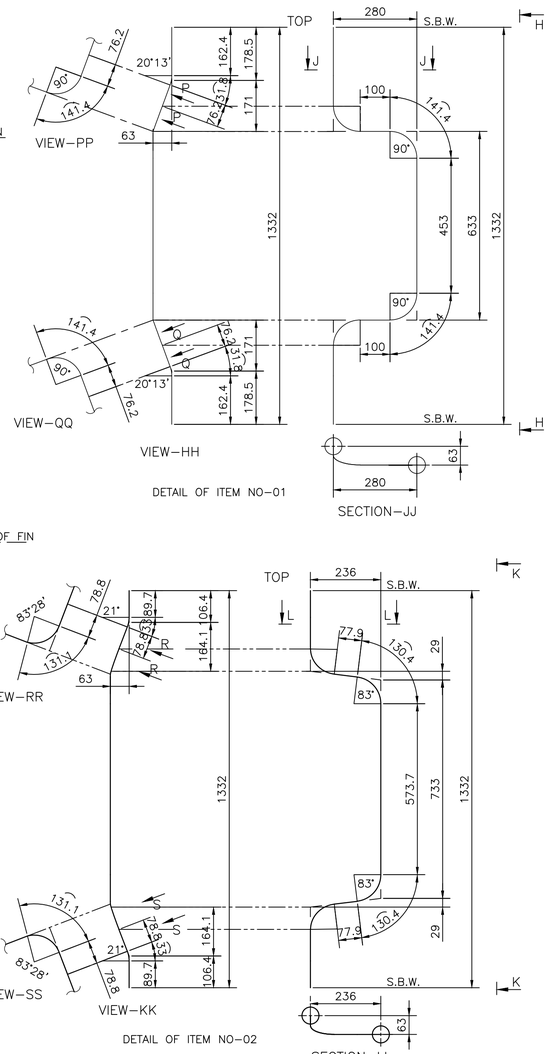


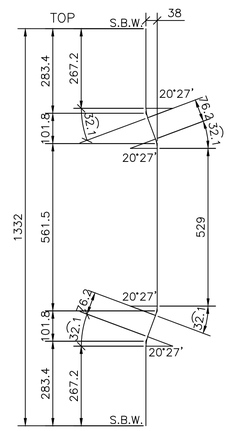
DETAIL OF PANEL CUT OUT





TYP WELDING DETAIL OF SHAPED PLATE





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

NOTES:

1. TOLERANCE UNLESS OTHERWISE SPECIFIED FRACTIONAL +1.5MM; ANGULAR +1°
2. ALL BEND RADII = 90
3. ALL TUBULAR MATERIALS ARE OF ATTEST QUALITY.
4. CUT OUT AREAS SHOULD BE GROUND FLUSH WITH THE SURFACE OF THE TUBES, DO NOT UNDER CUT TUBES.
5. FOR INSERT TUBE END SCARFING DETAILS REFER ASSY DRAWINGS.
6. FOR DESIGN PARAMETERS REFER ASSY. DRAWING.
7. AT TERMINATION OF MEMBRANE STRIP WELDING MUST BE TURNED ROUND END OF STRIP.
8. FOR WELDING OF FIN SEE ARRGT. DRG.NO 0-11-684-00808 & 0-11-684-00809
9. FOR OF SHAPED PLATE DETAILS SEE DRG.NO 1-11-684-02853

VARIANT NUMBER / ITEM NUMBER	DESCRIPTION	STD	DRAWING NUMBER	ITEM NO / VAR NO	MATERIAL CODE / MATERIAL SPECN	A/C/P / DI	UNIT / QUANTITY	UNIT WEIGHT	GS	ZONE
	08	SHAPED PLATE 6 THK;	1-11-684-02853		150422770000	C		2.810		
				08	SA387Gr12CL2			2		
	07	SHAPED PLATE 6 THK;	1-11-684-02853		150422770000	C		0.880		
				07	SA387Gr12CL2			4		
	06	SHAPED PLATE 6 THK;	1-11-684-02853		150422770000	C		0.540		
				06	SA387Gr12CL2			4		
	05	SHAPED PLATE 6 TH	1-11-684-02853		150422770000	C		0.570		
				05	SA387Gr12CL2			4		
	04	SHA 6 TH			150422770000	C		0.690		
				04	SA387Gr12CL2			2		
	03	TUB 134			15 495 003	A		13.200		
					SA213 Gr T23			2		
	02	TUBE D57.2x7.6 1655.5 LONG			15 495 003	A		16.300		
					SA213 Gr T23			2		
	01	TUBE D57.2x7.6 1759.4 LONG			15 495 003	A		17.300		
					SA213 Gr T23			2		
02		OPENING FOR AD-3						108.560		
					ASSY					
	04	SHAPED PLATE 6 THK;	1-11-684-02853		150422770000	C		0.940		
				03	SA387Gr12CL2			2		
	03	SHAPED PLATE 6 THK;	1-11-684-02853		150422770000	C		0.300		
				02	SA387Gr12CL2			4		
	02	SHAPED PLATE 6 THK;	1-11-684-02853		150422770000	C		0.240		
				01	SA387Gr12CL2			2		
	01	TUBE D57.2x7.6 716.8 LONG			15 495 003	A		7.100		
					SA213 Gr T23			2		
01		OPENING FOR OD-2						17.760		
					ASSY					

FOR TENDER PURPOSE ONLY

REV	DATE	ALTERED :
01		CHD & APPD :
ZONE		

CAUTION: The information on this document is the property of BHARAT HEAVY ELECTRICALS LTD. It must not be used directly or indirectly in any way detrimental to the interest of the company.

TYPE OF PRODUCT OR NAME OF CUSTOMER/PROJECT: BARH 660MW CUST NO:1701

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

	NAME	SIGNATURE	DATE
DRN	S.RANJITH		14.09.2010
CHD	R.B		15.09.2010
APPD	R.B		15.09.2010

DEPT PP | CODE 121 | ALL DIMENSIONS ARE IN MM | PROJECTION | SCALE N.T.S | WEIGHT (Kg) ---- | REF TO ASSY / OLD DWG D0801M0105-0410/00

TITLE: ASSEMBLY & DETAILS OF AD-3 & OD-2 OPENINGS. (CIRCUIT NO. S-07)

DRAWING NO: 1-11-684-02852 | REV 00

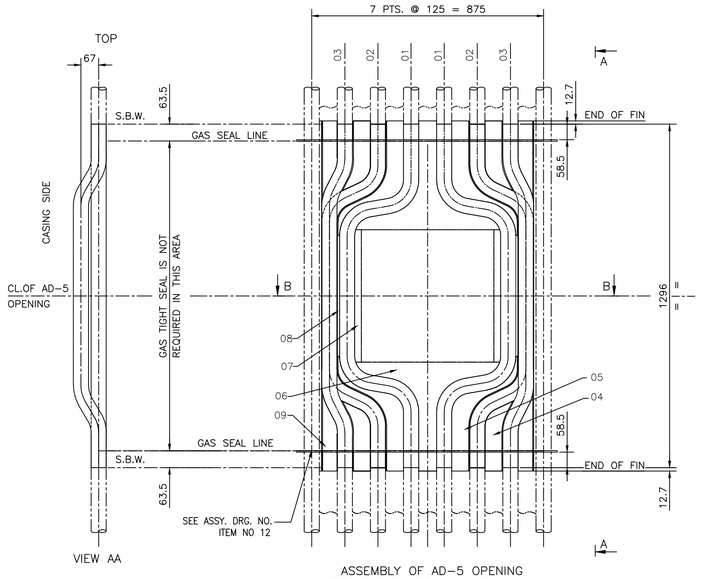
E-TENDER ENQUIRY NO.: PSER:PUR:BRH-S434-20 (ENQ:20:PP:0015:PUR:88) Date 05/03/2021.

DRAWING NO: CORPORATE DRG ID:TP-DG-1-11-767-04015/02

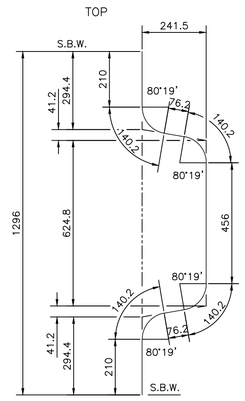
FOR TOLERANCES OF UNTOLERANCED DIMENSIONS DURING MANUFACTURE REFER PLANT STD. NO TP 023 0299

NOTES: –

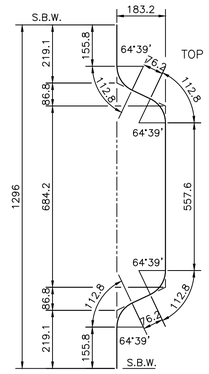
1. DESIGN PRESSURE: 284.8 Kg/cm²
2. DESIGN TEMPERATURE: 507.4°C
3. FOR DETAIL OF ATTACHEMENTS REFER DRG. 2–11–767–12100



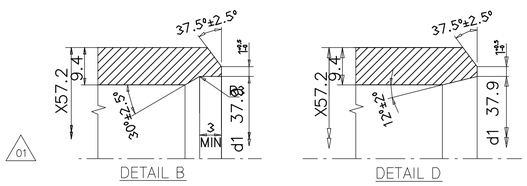
ASSEMBLY OF AD–5 OPENING
(FOR RIGHT SIDE WALL AS SHOWN)



DETAIL OF ITEM NO. 01
BEND RADIUS = 100
L.B.B. = 1589.2
TOTAL NO. OFF = 2



DETAIL OF ITEM NO 02
BEND RADIUS = 100
L.B.B. = 1472.8
TOTAL NO. OFF = 2

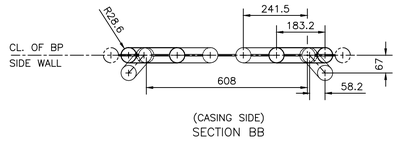


DETAIL–1

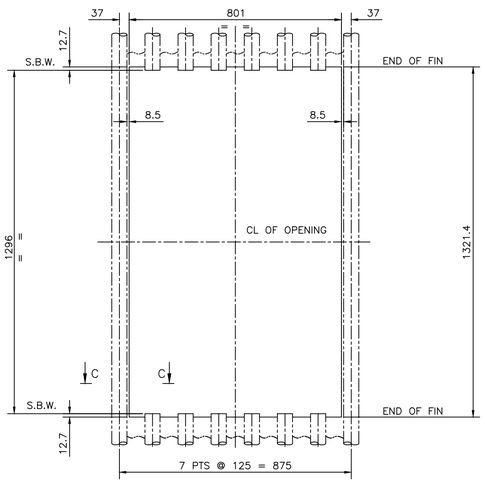
(TYP. WELD DETAIL OF S.B.W & F.W. ENDS)

FOR TENDER PURPOSE ONLY

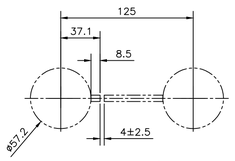
	09	6 THK SHAPED PLATE	2–11–767–12100		159422770000	C		0.590	
				06	SA387Gr12CL2			4	
	08	6 THK SHAPED PLATE	2–11–767–12100		159422770000	C		0.180	
				05	SA387Gr12CL2			2	
	07	6 THK SHAPED PLATE	2–11–767–12100		159422770000	C		0.600	
				04	SA387Gr12CL2			2	
	06	6 THK SHAPED PLATE	2–11–767–12100		159422770000	C		2.810	
				03	SA387Gr12CL2			2	
	05	6 THK SHAPED PLATE	2–11–767–12100		159422770000	C		1.300	
				02	SA387Gr12CL2			4	
	04	6 THK SHAPED PLATE	2–11–767–12100		159422770000	C		0.740	
				01	SA387Gr12CL2			4	
	03	TUBE D57.2x9.4 1346.7 LONG			154940032151	A		15.740	
					SA 213 GR.T12			2	
	02	TUBE D57.2x9.4 1472.8 LONG			154940032151	A		17.220	
					SA 213 GR.T12			2	
	01	TUBE D57.2x9.4 1589.2 LONG			154940032151	A		18.580	
					SA 213 GR.T12			2	
VARIANT NUMBER	ITEM NUMBER	DESCRIPTION	STD	DRAWING NUMBER	ITEM NO	A/C/P	UNIT	UNIT WEIGHT	GS ZONE
					VAR NO	MATERIAL SPECN	DI	QUANTITY	



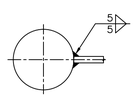
(CASING SIDE)
SECTION BB



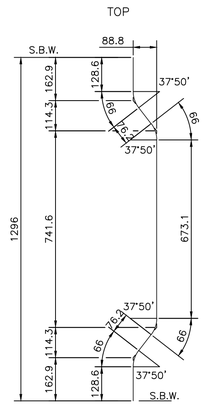
DETAIL OF PANEL CUT OUT



(CASING SIDE)
SECTION CC



TYP WELDING DETAIL OF SHAPED PLATE



DETAIL OF ITEM NO 03
BEND RADIUS = 100
L.B.B. = 1346.7
TOTAL NO. OFF = 2

REV	DATE	ALTERED : BAHAVATH	REV	DATE	ALTERED : NANDHINI
02	06.12.18	CHD & APPD : AK DIXIT	01	04.10.18	CHD & APPD : AK DIXIT
ZONE	NOTES ADDED		ZONE	DETAIL B/D IS ADDED.	

CAUTION: The information on this document is the property of BHARAT HEAVY ELECTRICALS LTD. It must not be used directly or indirectly in any way detrimental to the interest of the company.

TYPE OF PRODUCT OR NAME OF CUSTOMER/PROJECT: BARH II – 1x660 MW
CUST NO– 1701

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

	NAME	SIGNATURE	DATE
DRN	NANDHINI		26.09.18
CHD	AK DIXIT		26.09.18
APPD	S.A.K		26.09.18

DEPT	ALL DIMENSIONS ARE IN MM	PROJECTION	SCALE	WEIGHT (Kg)	REF TO ASSY / OLD DWG
PP			N.T.S	120.780	1–11–767–02914
CODE 121					

TITLE: ASMBLY & DETAIL OF AD–5 OPENING (CIRCUIT NO. S–12U)

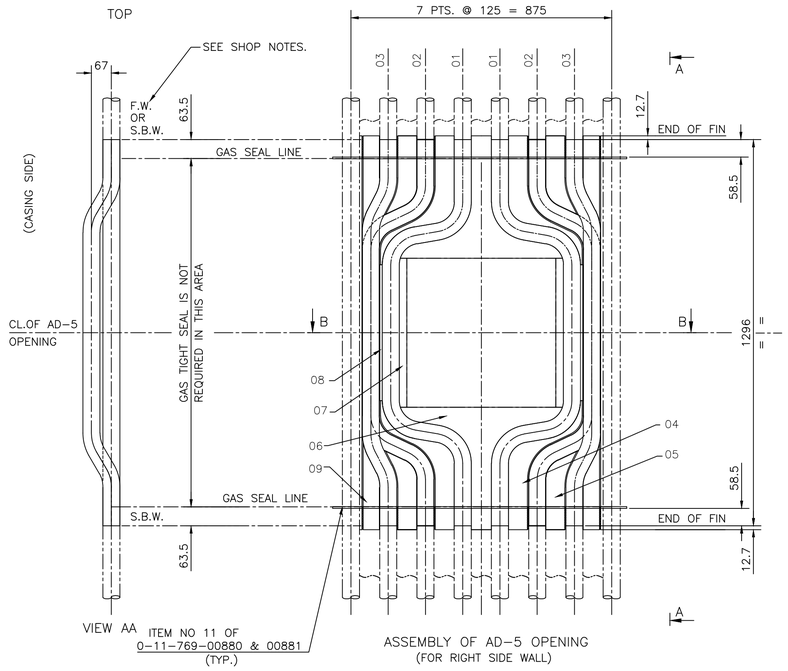
DRAWING NO : 1–11–767–04015 REV 02

CORPORATE DRG ID:TP-DG-1-11-767-04015/02

DRAWING NO: 1-11-769-04014

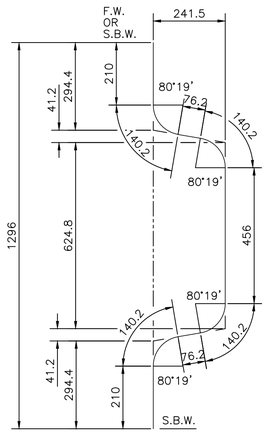
FOR TOLERANCES OF UNTOLERANCED DIMENSIONS DURING MANUFACTURE REFER PLANT STD. NO TP 023 0299

TOP



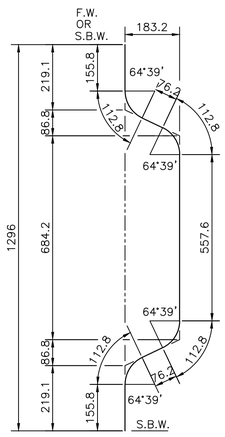
ASSEMBLY OF AD-5 OPENING
(FOR RIGHT SIDE WALL)

TOP



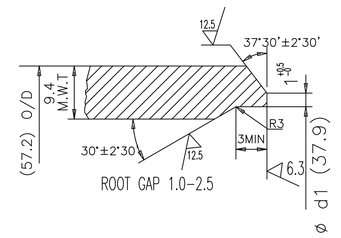
ITEM NO: 01
BEND RADIUS = 100
L.B.B. = 1589.2
TOTAL NO. OFF = 2

TOP



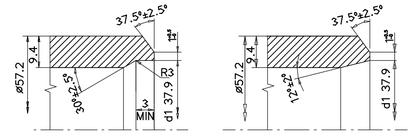
ITEM NO: 02
BEND RADIUS = 100
L.B.B. = 1472.8
TOTAL NO. OFF = 2

EDGE PREPARATIO DETAIL:-



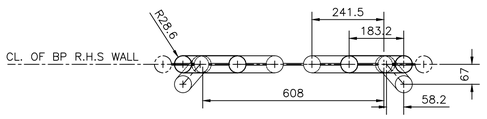
DETAIL-1

(TYP. WELD DETAIL OF S.B.W & F.W. ENDS)

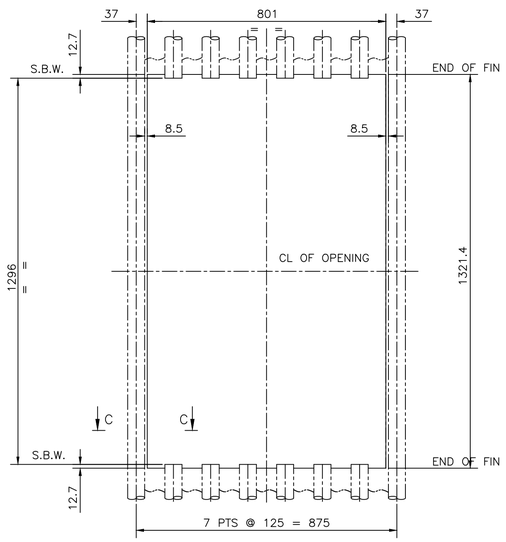


NOTES:- 01

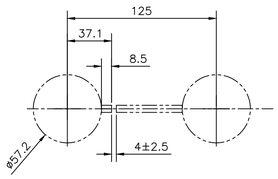
1. DESIGN PRESSURE: 284.8 Kg/cm²
02 2. DESIGN TEMPERATURE: 507.4°C
3. EDGE PREPARARATION FOR S.B.W AS PER DETAIL-1



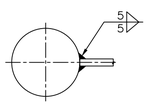
(CASING SIDE)
SECTION BB



DETAIL OF PANEL CUT OUT

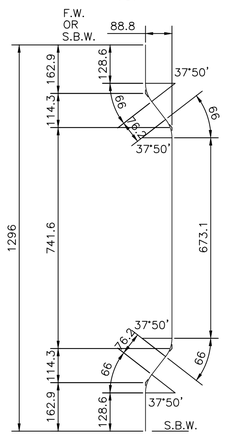


(CASING SIDE)
SECTION CC



TYP WELDING DETAIL OF SHAPED PLATE

TOP



ITEM NO: 03
BEND RADIUS = 100
L.B.B. = 1347.2
TOTAL NO. OFF = 2

FOR TENDER PURPOSE ONLY

09	SHAPED PLATE PL 6	2-11-769-12109		159422770000	C		0.590
			06	SA387Gr12CL2			4
08	SHAPED PLATE PL 6	2-11-769-12109		159422770000	C		0.180
			05	SA387Gr12CL2			2
07	SHAPED PLATE PL 6	2-11-769-12109		159422770000	C		0.600
			04	SA387Gr12CL2			2
06	SHAPED PLATE PL 6	2-11-769-12109		159422770000	C		2.810
			03	SA387Gr12CL2			2
05	SHAPED PLATE PL 6	2-11-769-12109		159422770000	C		1.300
			02	SA387Gr12CL2			4
04	SHAPED PLATE PL 6	2-11-769-12109		159422770000	C		0.74
			01	SA387Gr12CL2			4
03	TUBE D57.2x9.4 1347.2 LONG			154940032151	A		15.750
				SA213T12			2
02	TUBE D57.2x9.4 1472.8 LONG			154940032151	A		17.220
				SA213T12			2
01	TUBE D57.2x9.4 1589.2 LONG			154940032151	A		18.580
				SA213T12			2

VARIANT NUMBER	ITEM NUMBER	DESCRIPTION	STD	DRAWING NUMBER	ITEM NO / VAR NO	MATERIAL CODE / MATERIAL SPECN	A/C/P / DI	UNIT / QUANTITY	UNIT WEIGHT	GS	ZONE

REV	DATE	ALTERED : NANDHINI	REV	DATE	ALTERED : BAHAVATH	REV	DATE	ALTERED : BAHAVATH
03	21.12.18	CHD & APPD : AK DIXIT	02	8.12.18	CHD & APPD : AK DIXIT	01	06.12.18	CHD & APPD : AK DIXIT
ZONE	REVISION NO CORRECTED.		ZONE	NOTES CORRECTED		ZONE	NOTES ADDED	

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TYPE OF PRODUCT OR NAME OF CUSTOMER/PROJECT: BARH II - 1x660 MW CUST NO- 1701

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

	NAME	SIGNATURE	DATE
DRN	NANDHINI		26.09.18
CHD	AK DIXIT		26.09.18
APPD	SAK		26.09.18

DEPT PP | CODE 121 | ALL DIMENSIONS ARE IN MM | PROJECTION | SCALE N.T.S | WEIGHT (Kg) 120.800 | REF TO ASSY / OLD DWG 1-11-769-02948

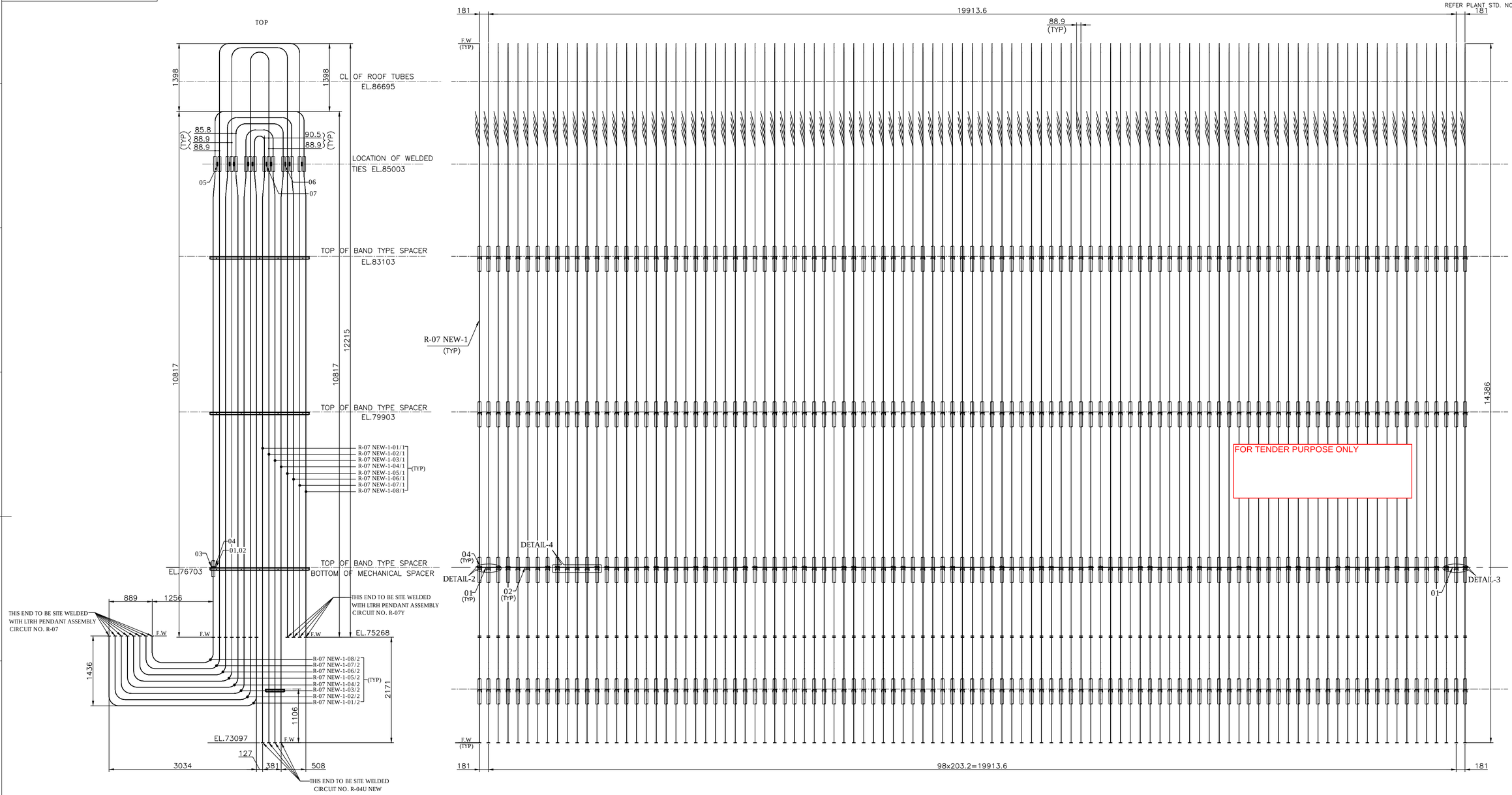
TITLE: ASMBLY & DETAIL OF AD-5 OPENING (CIRCUIT NO. S-12L)

DRAWING NO: 1-11-769-04014 | REV 03

E-TENDER ENQUIRY NO.: PSER:PUR:BRH-S434:20 (ENQ:20:PP:0015:PUR:88) Date 05/03/2021.

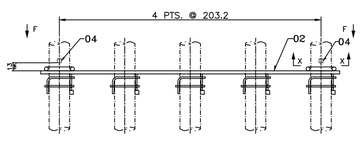
DRAWING NO: 1-16-270-01926

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

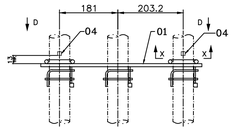


VIEW AA

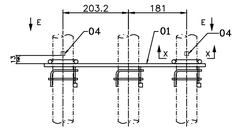
FOR TENDER PURPOSE ONLY



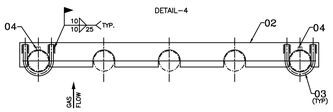
DETAIL-4



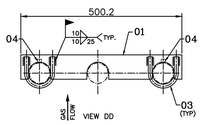
DETAIL-2



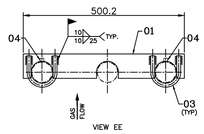
DETAIL-3



VIEW FF



VIEW DD

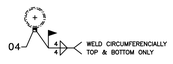


VIEW EE

MECHANICAL SPACER			
ITEM NO.	DESCRIPTION	NO. OFF	REMARKS
01	10 THK. MECHANICAL SPACER BAR	2	TO BE SHIPPED LOOSE TO SITE
02	10 THK. MECHANICAL SPACER BAR	19	TO BE SHIPPED LOOSE TO SITE
03	12 DIA. U-ROD	42	TO BE SHIPPED LOOSE TO SITE
04	12 x 12 x 12 THK. VERTICAL STOPPER	42	

TIE PLATE DETAILS			
ITEM NO.	DESCRIPTION	NO. OFF	REMARKS
05	TIE PLATE 10 THK	1212	
06	TIE PLATE 10 THK	404	
07	TIE PLATE 10 THK	404	

NOEES:
01. MECHANICAL SPACER DETAIS REFER DWG. NO. 1-16-270-01928.
02. TIE PLATE DETAILS REFER DWG. NO. 2-16-270-07804.



VIEW XX

REV	DATE	ALTERED :
01		CHD & APPD :
ZONE		

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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	S.SARKAR		17.03.2018
CHD	S.A.K		20.03.2018
APPD	S.A.K		20.03.2018

DEPT: PP
CODE: 121
ALL DIMENSIONS ARE IN MM
PROJECTION
SCALE: N.T.S
WEIGHT (Kg)
REF TO ASSY / OLD DWG: 1700 NEW MODEL (R-07 NEW) 1-17-776-00301

TITLE: ARRGT. OF ATTCH. ON LTRH PENDANT ASSEMBLY (R-07 NEW-01)

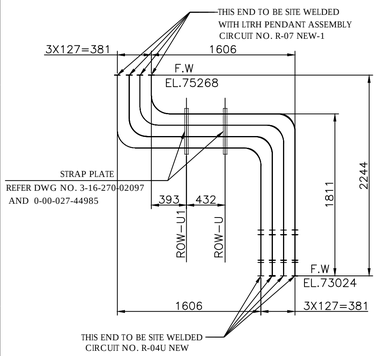
DRAWING NO : 1-16-270-01926

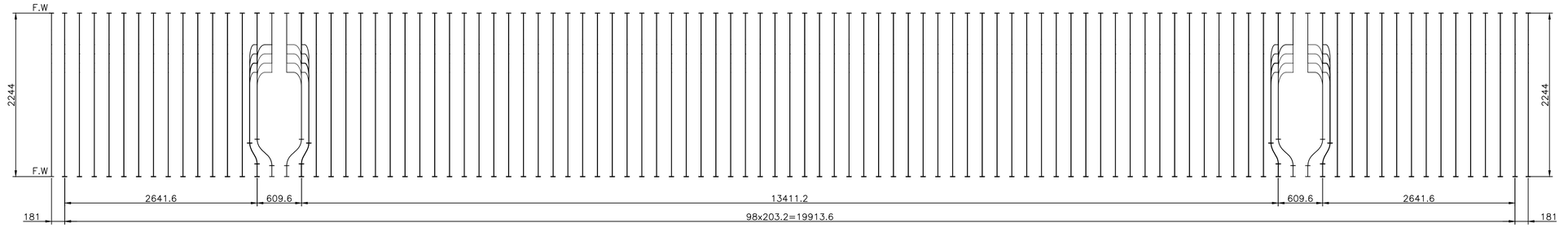
REV: 00

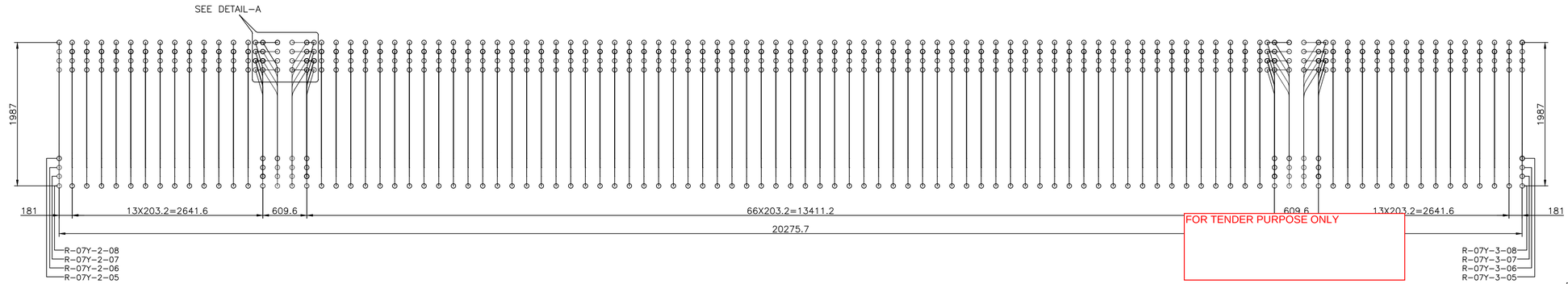
E-TENDER ENQUIRY NO.: PSER:PUR:BRH-S434:20 (ENQ:20:PP:0015:PUR:88) Date 05/03/2021.

DRAWING NO: 1-16-270-01927

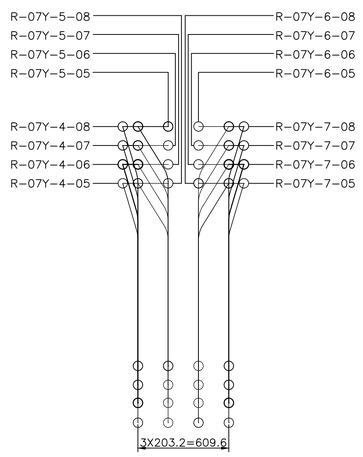
FOR TOLERANCES OF UNTOLERANCED DIMENSIONS DURING MANUFACTURE REFER PLANT STD. NO TP 023 0299







FOR TENDER PURPOSE ONLY



DETAIL-A

SL NO.	TUBE MARK. NO.	DWG. NO.	QTY.
01	R-07Y-1-05	3-16-270-02064	91
02	R-07Y-1-06	3-16-270-02065	91
03	R-07Y-1-07	3-16-270-02066	91
04	R-07Y-1-08	3-16-270-02067	91
05	R-07Y-2-05	3-16-270-02060	1
06	R-07Y-2-06	3-16-270-02061	1
07	R-07Y-2-07	3-16-270-02062	1
08	R-07Y-2-08	3-16-270-02063	1
09	R-07Y-3-05	3-16-270-02084	1
10	R-07Y-3-06	3-16-270-02085	1
11	R-07Y-3-07	3-16-270-02086	1
12	R-07Y-3-08	3-16-270-02087	1
13	R-07Y-4-05	3-16-270-02068	2
14	R-07Y-4-06	3-16-270-02069	2
15	R-07Y-4-07	3-16-270-02070	2
16	R-07Y-4-08	3-16-270-02071	2
13	R-07Y-5-05	3-16-270-02072	2
14	R-07Y-5-06	3-16-270-02073	2
15	R-07Y-5-07	3-16-270-02074	2
16	R-07Y-5-08	3-16-270-02075	2
17	R-07Y-6-05	3-16-270-02076	2
18	R-07Y-6-06	3-16-270-02077	2
19	R-07Y-6-07	3-16-270-02078	2
20	R-07Y-6-08	3-16-270-02079	2
21	R-07Y-7-05	3-16-270-02080	2
22	R-07Y-7-06	3-16-270-02081	2
23	R-07Y-7-07	3-16-270-02082	2
24	R-07Y-7-08	3-16-270-02083	2

STRAP PLATE DETAILS

ROW NO.	QTY (NOS)	DWG NO.
ROW- U	92	3-16-270-02097
ROW- U1	10	3-16-270-02097

REV	DATE	ALTERED :
01		CHD & APPD :
ZONE		

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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	S.SARKAR		17.03.2018
CHD	S.A.K		20.03.2018
APPD	S.A.K		20.03.2018

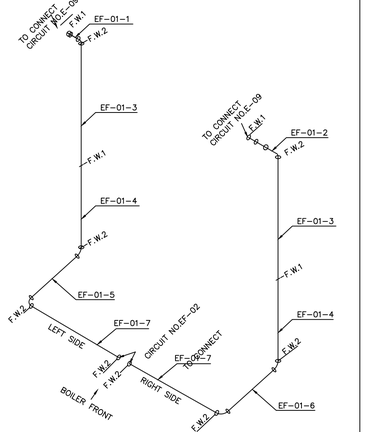
DEPT PP | CODE 121 | ALL DIMENSIONS ARE IN MM | PROJECTION | SCALE N.T.S | WEIGHT (Kg)

REF TO ASSY / OLD DWG
1700 NEW MODEL (R-07 NEW)
1-17-776-00301

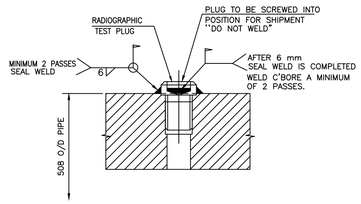
TITLE
ARRGT. OF ATTCH. ON LTRH PENDANT ASSEMBLY (R-07 NEW)

DRAWING NO : 1-16-270-01927 | REV 00

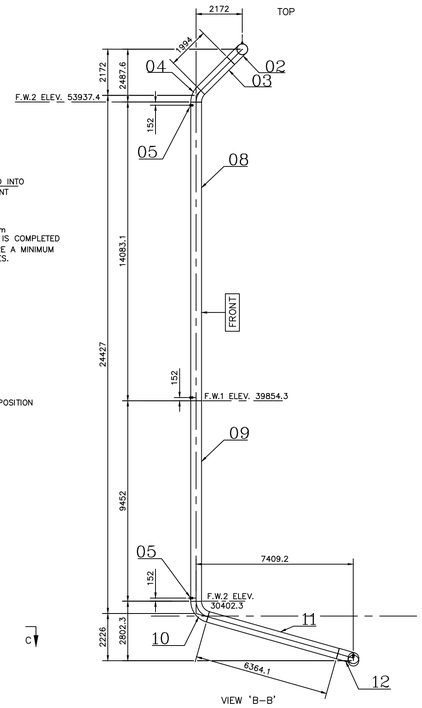
DRAWING NO: 1-19-851-02108

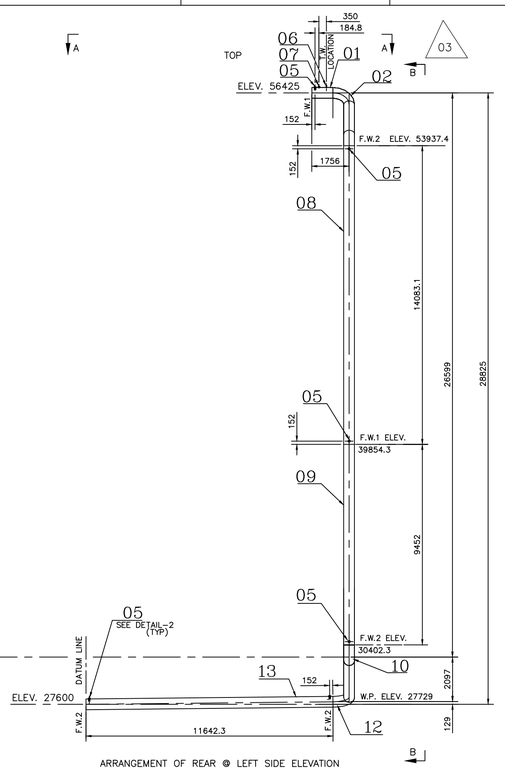


ARRANGEMENT VIEW OF ECON OUTLET LINK (CIRCUIT NO. EF-01)

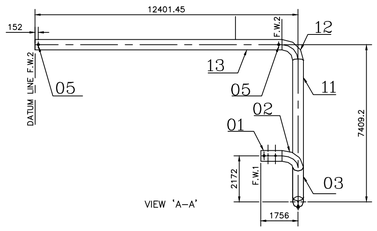


DETAIL – 2
TYPICAL ASSEMBLY OF RADIOGRAPHIC TEST PLUG WELDED IN POSITION

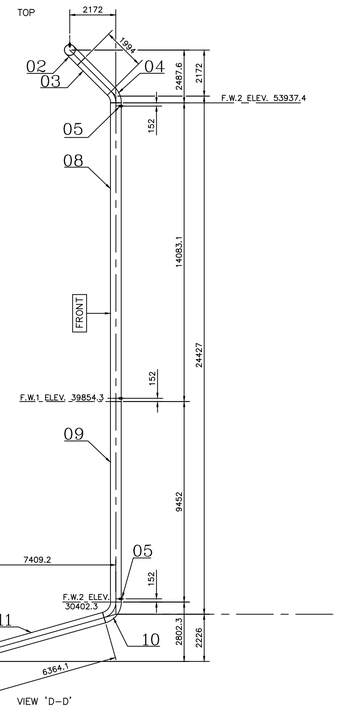




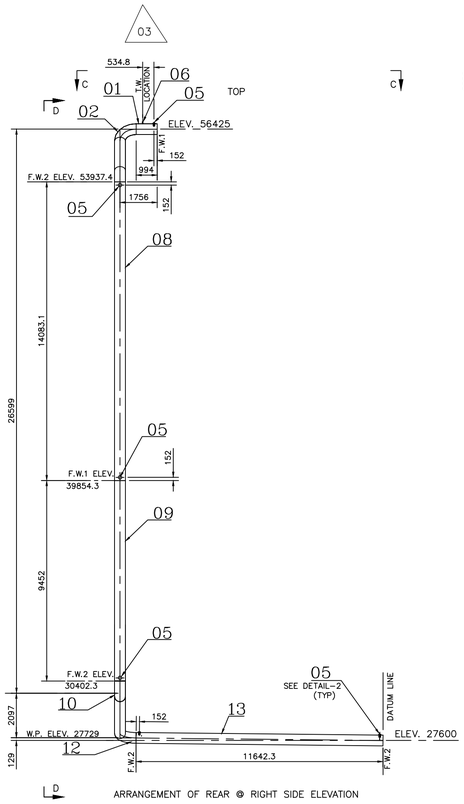
ARRANGEMENT OF REAR @ LEFT SIDE ELEVATION



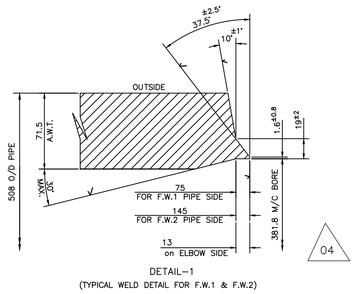
VIEW 'A–A'



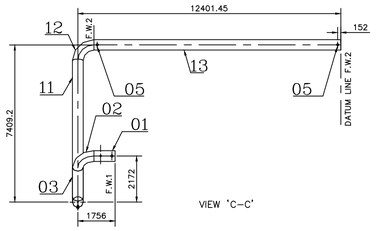
VIEW 'D–D'



ARRANGEMENT OF REAR @ RIGHT SIDE ELEVATION



DETAIL–1
(TYPICAL WELD DETAIL FOR F.W.1 & F.W.2)



VIEW 'C–C'

NOTES:

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

01. DESIGN, MANUFACTURE AND INSPECTION AS PER IBR.
02. DESIGN PRESSURE : 297.9 kg/sq.cm (g)
03. DESIGN TEMPERATURE : 348.8 deg c
04. (a) F.W. DENOTES FIELD WELD.
    (b) A.W.T. DENOTES AVERAGE WALL THICKNESS.
    (c) M.W.T. DENOTES MINIMUM WALL THICKNESS.
    (d) S.B.W. DENOTES SHOP BUTT WELD.
05. ALL. CAST NOS. AND INSPECTION MARKS TO REMAIN VISIBLE AT ALL TIMES.
06. END PREPARATION FOR SITE WELDING TO BE DONE AT SHOP AND TO BE SUITABLY PROTECTED WHILE SHIPPING. (04)
07. BRANCH WELD PREPARATION OF DIFFERENT CONNECTIONS WITH PIPE : SEE DRG 2–19–851–02731
08. HEAT TREATMENT : PIPES TO BE STRESS RELIEVED AS PER I.B.R. AFTER ALL WELDS ARE OVER.
09. N.D.T.: (a) RADIOGRAPHY AS PER I.B.R. FOR F.W. JOINTS AT SITE. FOR S.B.W. JOINTS SEE DETAIL DRG.
    (b) DIE PENETRATION TEST AS PER I.B.R. FOR ALL BRANCH WELDS AT SHOP.
10. HYDRAULIC TEST NEED NOT BE DONE AT SHOP.
11. SHARP EDGES OF BORE HOLE ON PIPE TO BE DEBURRED.
12. PAINT WORD 'TOP' AND 'FRONT' WHERE INDICATED.
13. QUANTITY TO BE MANUFACTURED PER BOILER : 1 No.
14. END PREPARATION FOR F.W.1 & F.W.2 REFER DETAIL–1
15. FOR ARRANGEMENT OF ATTACHMENT ITEM NO 17 REFER DRG. 1–19–851–02109
16. ITEM NOS 15 & 16 IS SUPPLIED FOR BOTH THE UNITS.
17. ITEM NOS 15(THERMOWELL) AND 16(PLUG FOR THERMOWELL) TO BE DESPATCHED AS SINGLE DU. FOR FIELD WELDING OF THERMOWELL REFER DRG. 2–19–851–02731

VARIANT NUMBER	ITEM NUMBER	DESCRIPTION	STD	DRAWING NUMBER	ITEM NO / VAR NO	MATERIAL CODE / MATERIAL SPECN	A/C/P	UNIT / DI	UNIT WEIGHT / QUANTITY	GS	ZONE
	17	LUG PLATE 32x102x152		3–19–851–03949		159421150000	C		3.900		
						SA 515Gr70			16		
	16	PLUG FOR THERMOWELL		4–19–850–06297		153392410000	A		0.100		
						SA 182F12CL2			4		
	15	THERMOWELL 1/2" NPT		3–19–850–03944		153392410000	A		2.100		
						SA 182F12CL2			4		
	14	PLUG FOR T.C CONN. STUB		4–19–850–06296		153391440000	A		1.500		
						SA 105			2		
	13	PIPE D508x71.5 11642.3 LONG				150834316000	A		8960.800		
						SA 106 Gr.C			2		
	12	ELBOW 89.8 DEG D508x71.5(NOM)		3–19–851–03948		921042330000	A		920.000		
						SA 234 Gr.WPC			2		
	11	PIPE D508x71.5 6364.1 LONG				150834316000	A		4898.300		
						SA 106 Gr.C			2		
	10	ELBOW 74.2 DEG D508; T=71.5(NOM)				0000	A		760.000		
						r.WPC			2		
	09	PIPE D508x71.5 9452 LONG				6000	A		7275.000		
						Gr.C			2		
	08	PIPE D508x71.5 14083.1 LONG				150834316000	A		10839.500		
						SA 106 Gr.C			2		
	07	SOCKET D76.2; T=18.6		2–19–851–02731		153391440000	A		1.700		
					03	SA 105			1		
	06	THERMOWELL CONN.STUB D70x10.75		2–19–851–02731		153391440000	A		1.700		
					02	SA 105			2		
	05	25.4 RADIOGRAPHIC TEST PLUG		2–19–851–02731		153391410000	A		0.400		
					01	SA 105			12		
	04	ELBOW 45 DEG D508; T=71.5(NOM)		3–19–851–03946		921042330000	A		461.000		
						SA 234 Gr.WPC			2		
	03	PIPE D508x71.5 1994 LONG				150834316000	A		1534.700		
						SA 106 Gr.C			2		
	02	ELBOW 90 DEG D508; T=71.5(NOM)		3–19–851–03945		921042330000	A		922.000		
						SA 234 Gr.WPC			2		
	01	PIPE D508x71.5 994 LONG				150834316000	A		765.000		
						SA 106 Gr.C			2		

FOR TENDER PURPOSE ONLY

REV	DATE	ALTERED : KRISHNA	REV	DATE	ALTERED : G.M.RAJ	REV	DATE	ALTERED : G.M.RAJ	REV	DATE	ALTERED : R.S.R
04	08.08.12	CHD & APPD : S.A.K	03	08.10.11	CHD & APPD : S.A.K	02	06.10.11	CHD & APPD S.A.K	01	24.09.11	CHD & APPD N.KIRUBAKARN
ZONE		DETAIL–1, NOTES CORRECTED.	ZONE		NOTE–17 ADDED. T.W LOCATION INDICATED.	ZONE		NOTE 16 ADDED.	ZONE		IN BOM,ITEM.NO:1/2" NPT WAS M20x1.5(DRAFTING ERROR CORRECTED)

CAUTION: The information on this document is the property of BHARAT HEAVY ELECTRICALS LTD. It must not be used directly or indirectly in any way detrimental to the interest of the company.

TYPE OF PRODUCT OR NAME OF CUSTOMER/PROJECT: BARH II – 1x660 MW CUST NO– 1701

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

	NAME	SIGNATURE	DATE
DRN	G.M.RAJ		10.01.2011
CHD	S.A.K		12.01.2011
APPD	S.A.K		12.01.2011

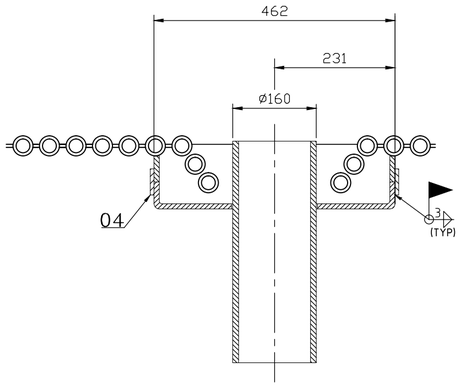
DEPT: PP | CODE: 121 | ALL DIMENSIONS ARE IN MM | PROJECTION | SCALE: N.T.S | WEIGHT (Kg) | REF TO ASSY / OLD DWG: D0801M0105–1816/01

TITLE: ARRGMT. OF ECO OUTLET LINK (CIRCUIT NO. EF–01)

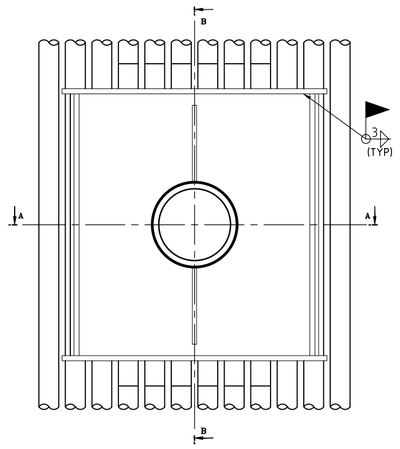
DRAWING NO : 1–19–851–02108 | REV 04

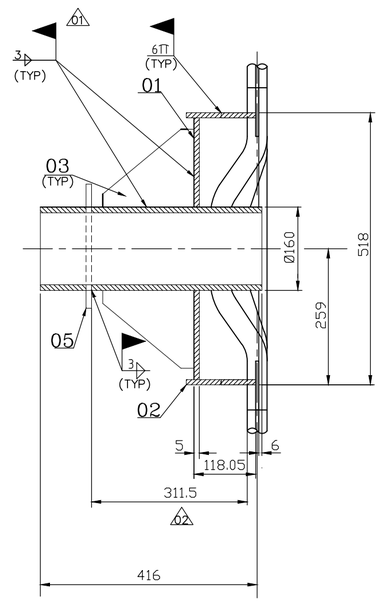
DRAWING NO: 2-09-001-01040

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

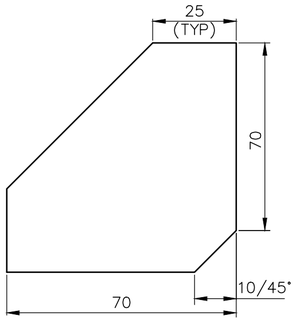


SECTION-AA





SECTION-BB



ITEM No: 03

NOTES:

1. ALL WELDS ARE TO BE SEAL WELDED GAS TIGHT UNLESS OTHERWISE SPECIFIED.
2. ERECTOR TO CUT CORNER OF SCALLOPPED BAR SO AS TO PROVIDE A CLEARANCE BETWEEN ADJACENT TUBE AND A COMPLETE SEAL WELD AROUND THE EDGE OF SEAL BOX.
3. SEAL BOX IS TO BE FILLED WITH CASTABLE REFACTORY. (REFER DRG NO: 3-09-002-00194)
4. PAINT THE SURFACE OF ALL TUBES THAT ARE EMBEDED IN CASTABLE REFRACTORY WITH TWO COATS OF BITUMASTIC PAINT.
5. ITEM No:05 SHOULD BE PLACED IN LINE WITH L&I DRAWING.

VARIANT NUMBER	ITEM NUMBER	DESCRIPTION	STD	DRAWING NUMBER	ITEM NO / VAR NO	MATERIAL CODE / MATERIAL SPECN	A/C/P / DI	UNIT	UNIT WEIGHT / QUANTITY	GS	ZONE
	05	FACE PLATE		4-09-001-00642		15 011 182 IS1079D			3.450 1		
	04	PL.6x50x508				15 011 092 IS 2062GRA		L	1.200 2		
	03	PL.6; 70x70				11 092 062GRA			0.230 2		
	02	PL.6x48x462				11 092 062GRA		L	1.000 2		
	01	SEAL BOX WITH SLEEVE		3-09-001-00540		WELDMENT		L	23.000 1		

FOR TENDER PURPOSE ONLY

REV	DATE	ALTERED : A.DHARMA	REV	DATE	ALTERED : R.MANI
02	14.06.12	CHD & APPD : R.MURALI	01	15.03.11	CHD & APPD : R.MURALI
ZONE E4	DIMENSION MARKED.		ZONE C4	SITE WELD MARKED.	

CAUTION: The information on this document is the property of BHARAT HEAVY ELECTRICALS LTD. It must not be used directly or indirectly in any way detrimental to the interest of the company.

TYPE OF PRODUCT OR NAME OF CUSTOMER/PROJECT

Bharat Heavy Electricals Ltd
UNIT: HIGH PRESSURE BOILER PLANT
TIRUCHIRAPALLI - 620014
355-054

	NAME	SIGNATURE	DATE
DRN	R.MANI		14.02.11
CHD	R.MURALI		16.02.11
APPD	R.MURALI		18.02.11

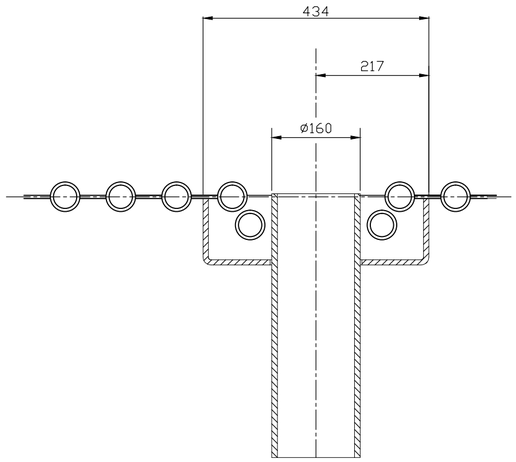
DEPT	ALL DIMENSIONS ARE IN MM	PROJECTION	SCALE	WEIGHT (Kg)	REF TO ASSY / OLD DWG
PP			NTS	31.310	
CODE 121					

TITLE: SEAL BOX ASSY FOR SOOT BLOWER (RT-1)

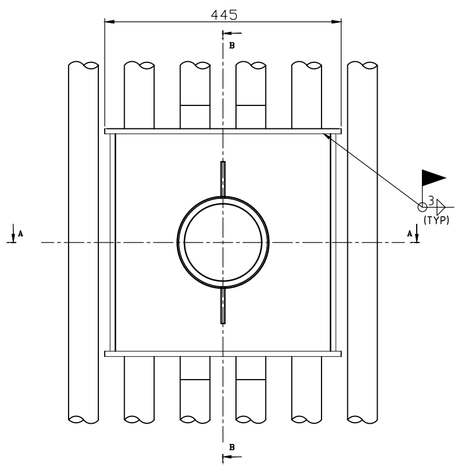
DRAWING NO : 2-09-001-01040 REV 02

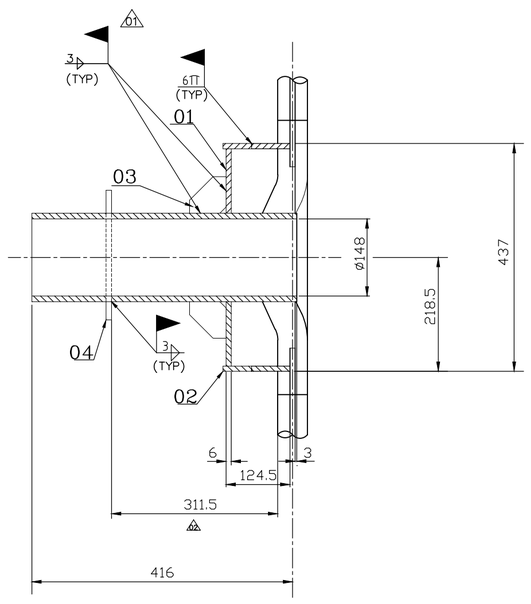
DRAWING NO: 2-09-001-01041

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

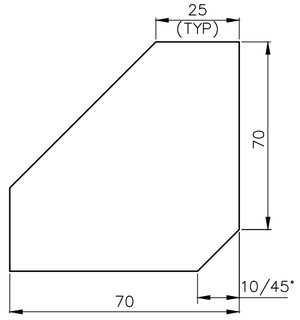


SECTION-AA





SECTION-BB



ITEM No: 03

NOTES:

1. ALL WELDS ARE TO BE SEAL WELDED GAS TIGHT UNLESS OTHERWISE SPECIFIED.
2. ERECTOR TO CUT CORNER OF SCALLOPPED BAR SO AS TO PROVIDE A CLEARANCE BETWEEN ADJACENT TUBE AND A COMPLETE SEAL WELD AROUND THE EDGE OF SEAL BOX.
3. SEAL BOX IS TO BE FILLED WITH CASTABLE REFACTORY. (REFER DRG NO: 3-09-002-00194)
4. PAINT THE SURFACE OF ALL TUBES THAT ARE EMBEDED IN CASTABLE REFRACTORY WITH TWO COATS OF BITUMASTIC PAINT.
5. ITEM No: 04 SHOULD BE PLACED IN LINE WITH L&I DRAWING.

VARIANT NUMBER	ITEM NUMBER	DESCRIPTION	STD	DRAWING NUMBER	ITEM NO / VAR NO	MATERIAL CODE / MATERIAL SPECN	A/C/P	UNIT / DI	UNIT WEIGHT / QUANTITY	GS	ZONE
	04	FACE PLATE		4-09-001-00642		15 011 182 / IS1079D		L	3.450 / 1		
	03	PL.6; 70x70				15 011 092 / E410A		L	0.230 / 2		
	02	PL.6x60x445				15 011 092 / 2GRA		L	1.250 / 2		
	01	SEAL BOX WITH SLEEVE				ENT		L	21.270 / 1		

FOR TENDER PURPOSE ONLY

REV	DATE	ALTERED : A.DHARMA	REV	DATE	ALTERED : R.MANI
02	14.06.12	CHD & APPD : R.MURALI	01	15.03.11	CHD & APPD : R.MURALI
ZONE E4	DIMENSION MARKED.		ZONE C4	SITE WELD MARKED.	

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TYPE OF PRODUCT OR NAME OF CUSTOMER/PROJECT

Bharat Heavy Electricals Ltd
UNIT: HIGH PRESSURE BOILER PLANT
TIRUCHIRAPALLI – 620014
355-054

	NAME	SIGNATURE	DATE
DRN	R.MANI		14.02.11
CHD	R.MURALI		16.02.11
APPD	R.MURALI		18.02.11

DEPT	ALL DIMENSIONS ARE IN MM	PROJECTION	SCALE	WEIGHT (Kg)	REF TO ASSY / OLD DWG
PP			NTS	27.680	
CODE 121					

TITLE: SEAL BOX ASSY FOR SOOT BLOWER (RT-2)

DRAWING NO : 2-09-001-01041

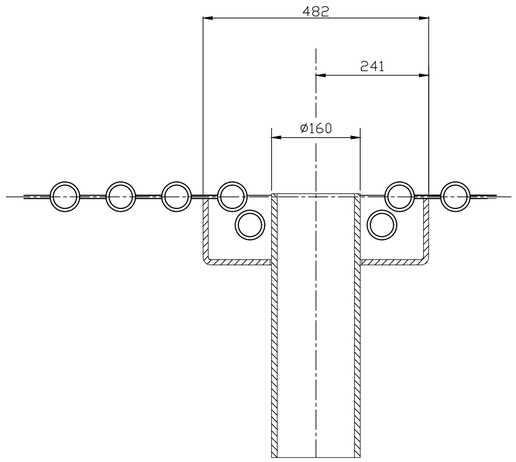
REV 02

E-TENDER ENQUIRY NO.: PSER:PUR:BRH-S434:20 (ENQ:20:PP:0015:PUR:88) Date 05/03/2021.

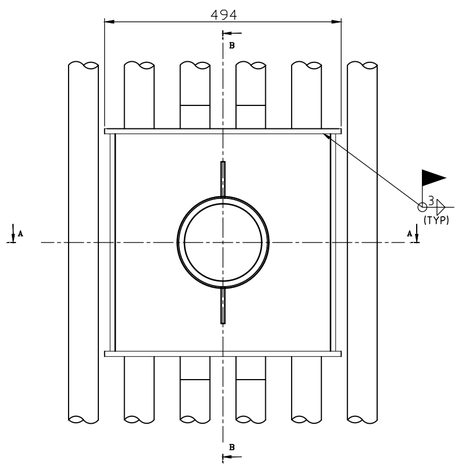
CORPORATE DRG ID:TP-DG-2-09-001-01042/03

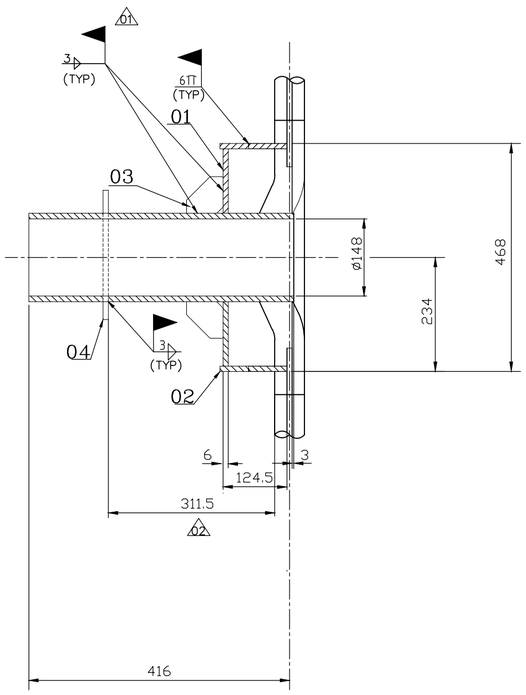
DRAWING NO: 2-09-001-01042

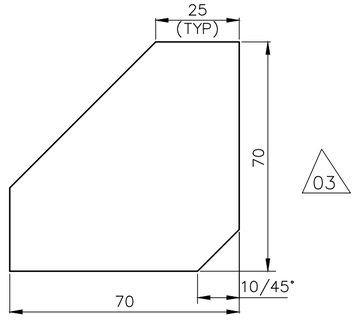
FOR TOLERANCES OF UNTOLERANCED DIMENSIONS DURING MANUFACTURE REFER PLANT STD. NO TP 023 0299



SECTION-AA







ITEM No: 03

NOTES:

1. ALL WELDS ARE TO BE SEAL WELDED GAS TIGHT UNLESS OTHERWISE SPECIFIED.
2. ERECTOR TO CUT CORNER OF SCALLOPPED BAR SO AS TO PROVIDE A CLEARANCE BETWEEN ADJACENT TUBE AND A COMPLETE SEAL WELD AROUND THE EDGE OF SEAL BOX.
3. SEAL BOX IS TO BE FILLED WITH CASTABLE REFACTORY. (REFER DRG NO: 3-09-002-00194)
4. PAINT THE SURFACE OF ALL TUBES THAT ARE EMBEDED IN CASTABLE REFRACTORY WITH TWO COATS OF BITUMASTIC PAINT.

VARIANT NUMBER	ITEM NUMBER	DESCRIPTION	STD	DRAWING NUMBER	VAR NO	MATERIAL SPECN	A/C/P	UNIT	UNIT WEIGHT	GS	ZONE
								DI	QUANTITY		
	04	FACE PLATE		4-09-001-00642		15 011 182 IS1079D	L		3.450 1		
	03	PL.6; 70x70				15 011 092 IS 2062GRA	L		0.230 2		
	02	PL.6x60x494				2 RA	L		1.400 2		
	01	SEAL BOX WITH SLEEVE				T	L		23.270 1		

FOR TENDER PURPOSE ONLY

SECTION-BB

REV	DATE	ALTERED : SAROJ
03	26.07.19	CHD & APPD : S.A.K
ZONE	DIMENSION CORRECTED.	

REV	DATE	ALTERED : A.DHARMA
02	14.06.12	CHD & APPD : R.MURALI
ZONE E4	DIMENSION MARKED.	

REV	DATE	ALTERED : R.MANI
01	15.03.11	CHD & APPD : R.MURALI
ZONE C4	SITE WELD MARKED.	

CAUTION: The information on this document is the property of BHARAT HEAVY ELECTRICALS LTD. It must not be used directly or indirectly in any way detrimental to the interest of the company.

TYPE OF PRODUCT OR NAME OF CUSTOMER/PROJECT

Bharat Heavy Electricals Ltd
UNIT: HIGH PRESSURE BOILER PLANT
TIRUCHIRAPALLI – 620014
355-054

	NAME	SIGNATURE	DATE
DRN	R.MANI		14.02.11
CHD	R.MURALI		16.02.11
APPD	R.MURALI		17.02.11

DEPT	ALL DIMENSIONS ARE IN MM	PROJECTION	SCALE	WEIGHT (Kg)	REF TO ASSY / OLD DWG
PP			NTS	29.980	
CODE 121					

TITLE: SEAL BOX ASSY FOR SOOT BLOWER (RT-3)

DRAWING NO : 2-09-001-01042 REV 03

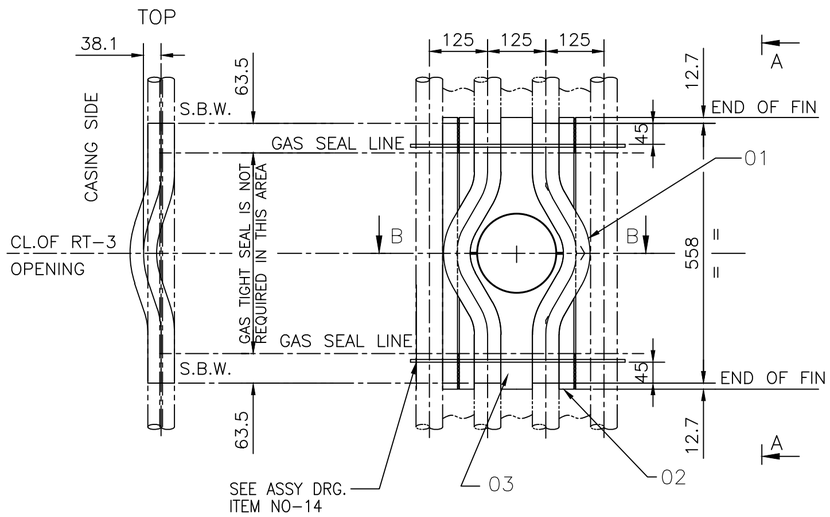
CORPORATE DRG ID:TP-DG-2-09-001-01042/03

E-TENDER ENQUIRY NO.: PSER:PUR:BRH-S434:20 (ENQ:20:PP:0015:PUR:88) Date 05/03/2021.

CORPORATE DRG ID:TP-DG-2-11-767-15515/02

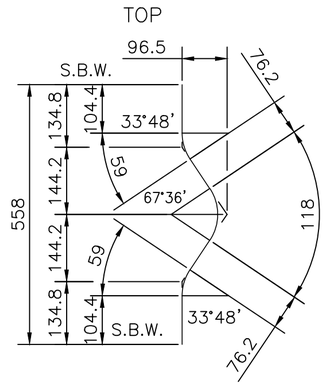
DRAWING NO: 2-11-767-15515

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

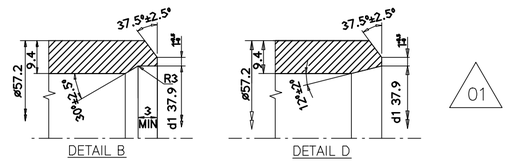


VIEW AA

ASSEMBLY OF RT-3 OPENING
(FOR RIGHT SIDE WALL AS SHOWN)



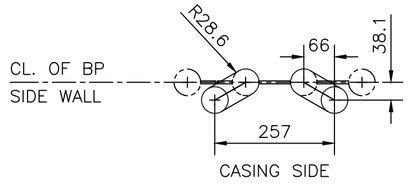
DETAIL OF ITEM NO. 01
BEND RADIUS = 100
TOTAL NO. OFF = 2



DETAIL-1

(TYP. WELD DETAIL OF S.B.W & F.W. ENDS)

VARIANT NUMBER	ITEM NUMBER	DESCRIPTION	STD	DRAWING NUMBER	ITEM NO / VAR NO	MATERIAL CODE / MATERIAL SPECN	A/C/P	UNIT / DI	UNIT WEIGHT / QUANTITY	GS	ZONE
	03	6 THK SHAPED PLATE		3-11-767-04566		159422770000	C		0.900		
					02	SA 387 GR.12 CL.2			2		
	02	6 THK SHAPED PLATE		3-11-767-04566		159422770000	C		0.250		
					01	SA 387 GR.12 CL.2			4		
	01	TUBE D57.2X9.4				154940032151	A		6.980		
		597.2 LONG				SA 213 GR.T12			2		

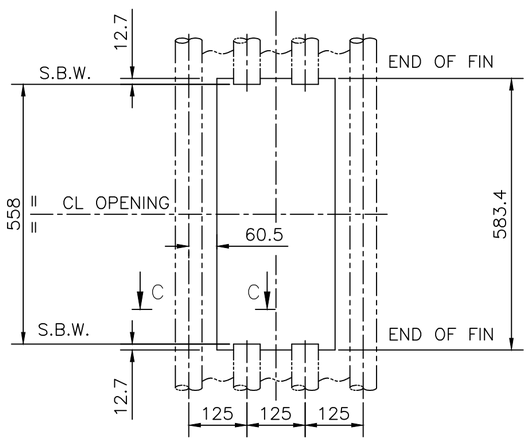


SECTION BB

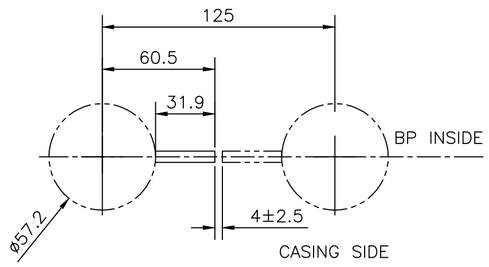
02

NOTES:

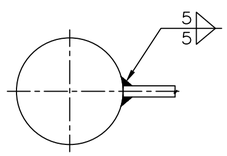
1. DESIGN PRESSURE: 284.8 Kg/cm²
2. DESIGN TEMPERATURE: 507.4°C



DETAIL OF PANEL CUT OUT



SECTION CC



TYP WELDING DETAIL OF SHAPED PLATE

REV	DATE	ALTERED : BAHAVATH
02	06.12.18	CHD & APPD :AK DIXIT
ZONE	NOTES ADDED	
REV	DATE	ALTERED : NANDHINI
01	04.10.18	CHD & APPD : AK DIXIT
ZONE	DETAIL B/D IS ADDED.	

CAUTION: The information on this document is the property of BHARAT HEAVY ELECTRICALS LTD. It must not be used directly or indirectly in any way detrimental to the interest of the company.

FOR TENDER PURPOSE ONLY

TYPE OF PRODUCT OR NAME OF CUSTOMER/PROJECT: BARH II – 1x660 MW, CUST NO– 1701

Bharat Heavy Electricals Ltd
UNIT: HIGH PRESSURE BOILER PLANT
TIRUCHIRAPALLI – 620014
355-054

	NAME	SIGNATURE	DATE
DRN	NANDHINI		26.09.18
CHD	AK DIXIT		26.09.18
APPD	S.A.K		26.09.18

DEPT PP | CODE 121 | ALL DIMENSIONS ARE IN MM | PROJECTION | SCALE N.T.S | WEIGHT (Kg) 16.760 | REF TO ASSY / OLD DWG 2-11-767-12098

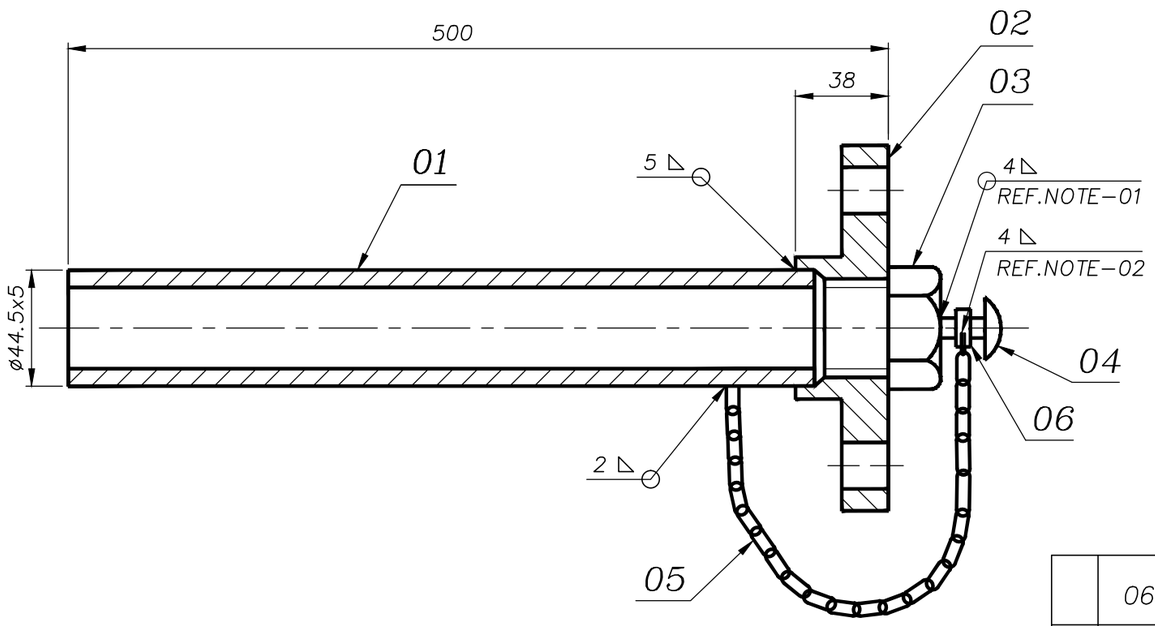
TITLE: ASMBLY & DETAIL OF RT-3 OPENING
(CIRCUIT NO. S-12U)

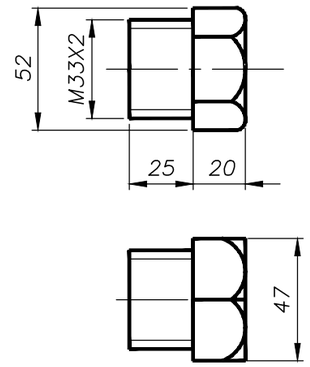
DRAWING NO : 2-11-767-15515 | REV 02

CORPORATE DRG ID:TP-DG-2-11-767-15515/02

DRAWING NO: 3-09-002-00514

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

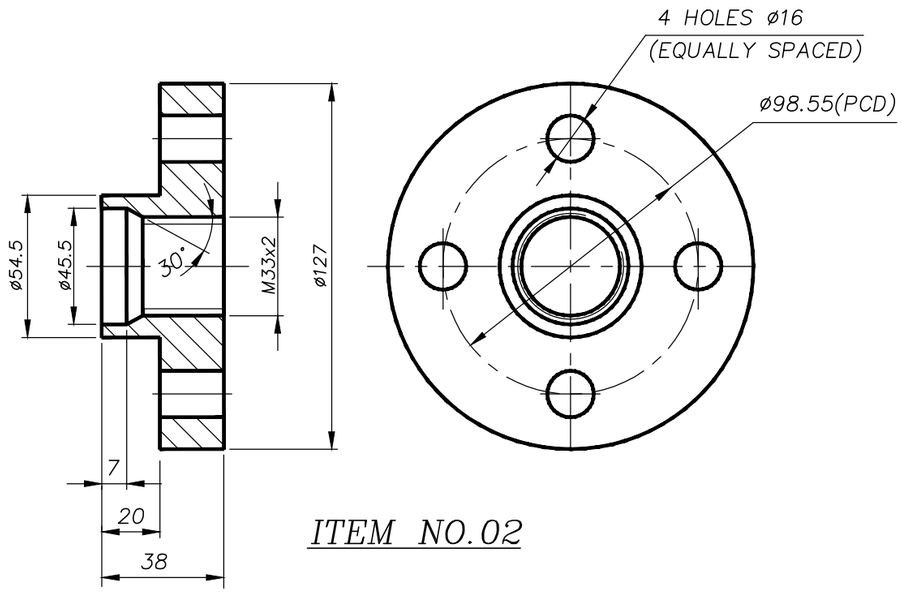




ITEM NO.03

NOTES

01. ITEM NO.06 TO BE INSERTED BEFORE WELDING ITEM NO.04 WITH ITEM NO.03.
02. ITEM NO.05 SHOULD BE OVERLAPPED WITH ITEM NO.06 AND WELDED TOGETHER



ITEM NO.02

VARIANT NUMBER	ITEM NUMBER	DESCRIPTION	STD	DRAWING NUMBER	ITEM NO / VAR NO	MATERIAL CODE / MATERIAL SPECN	A/C/P	UNIT / DI	UNIT WEIGHT / QUANTITY	GS
	06	WASHER PNCHD A12	S	41408 12000		41408 00012			0.010 / 1	
	05	LINK CHAIN 600L D3X17X12				530131080002			0.120 / 1	
	04	RIVET SNAP 10X10	S	41801 10010		41801 10010			0.010 / 1	
	03	ROD D63; 45 LONG				15 039 118 / SA 193 B7	C		0.580 / 1	
	02	PL D127; 38 LONG				15 042 272 / SA 387 GR22 CL2	C		1.750 / 1	
	01	TUBE D44.5X5; 469 LONG				154890350001 / SA 213 T22	C		2.420 / 1	

REV	DATE	ALTERED :
01		CHD & APPD:
ZONE		

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TYPE OF PRODUCT OR NAME OF CUSTOMER/PROJECT

Bharat Heavy Electricals Ltd
UNIT: HIGH PRESSURE BOILER PLANT
TIRUCHIRAPALLI – 620014
355-055

	NAME	SIGNATURE	DATE
DRN	R.MANI		12.01.11
CHD	R.MURALI		13.01.11
APPD	R.MURALI		18.01.11

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

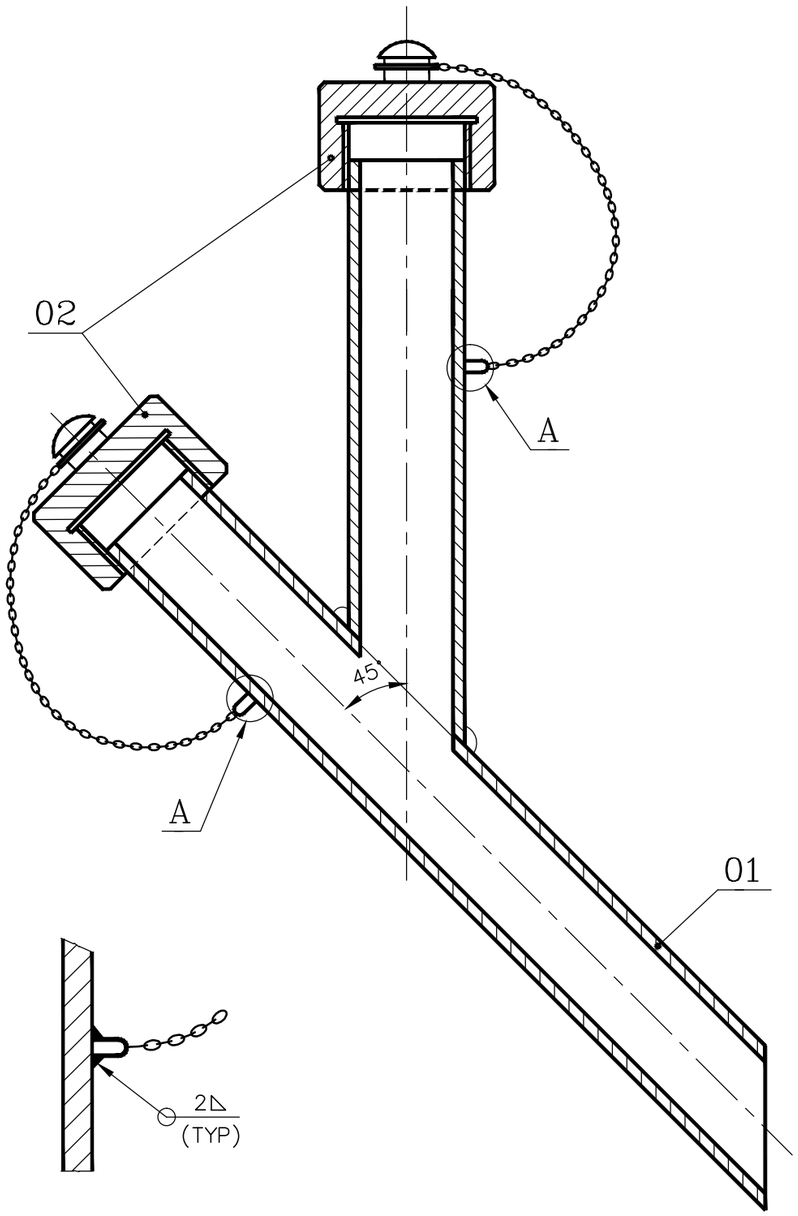
FOR TENDER PURPOSE ONLY

TITLE: TEMPERATUR ASSEM

0514 | REV 00

DRAWING NO: 3-09-002-00515

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



DETAIL–A

VARIANT NUMBER	ITEM NUMBER	DESCRIPTION	STD	DRAWING NUMBER	ITEM NO / VAR NO	MATERIAL CODE / MATERIAL SPECN	A/C/P	UNIT / DI	UNIT WEIGHT / QUANTITY	GS
	02	PIPE CAP WITH CHAIN		3-09-002-00467		WELDMENT			0.746 / 2	
	01	PRESSURE MEASUREMENT TUBE		3-09-002-00516		WELDMENT			5.500 / 1	

REV	DATE	ALTERED :
01		CHD & APPD:
ZONE		

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TYPE OF PRODUCT OR NAME OF CUSTOMER/PROJECT

Bharat Heavy Electricals Ltd
UNIT: HIGH PRESSURE BOILER PLANT
TIRUCHIRAPALLI – 620014
355-055

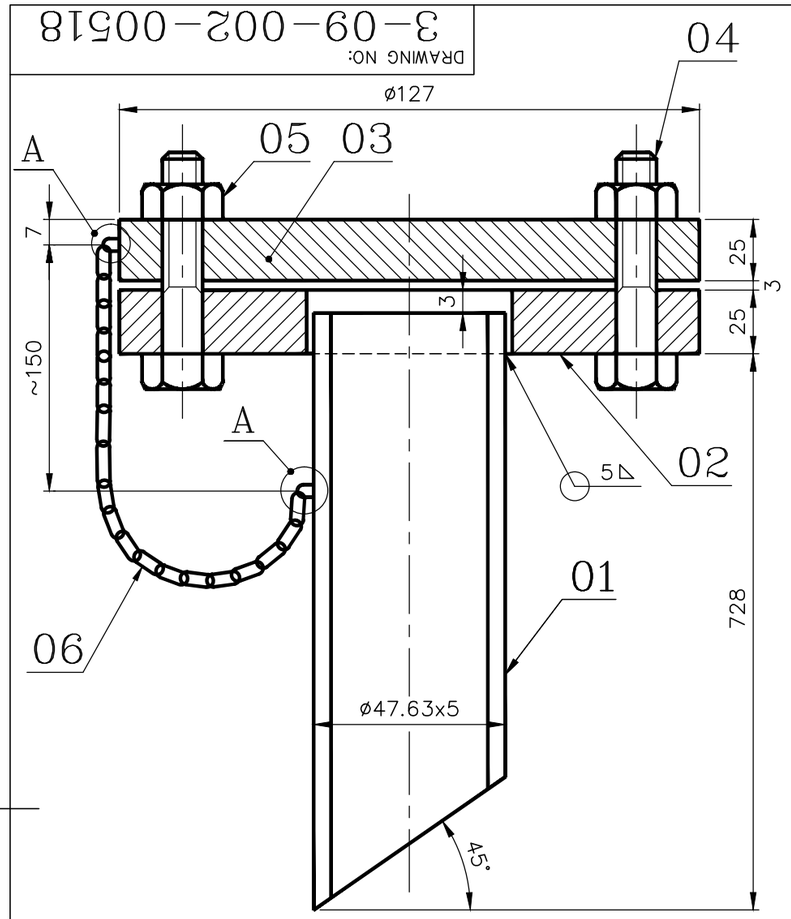
	NAME	SIGNATURE	DATE
DRN	R.MANI		12.01.11
CHD	R.MURALI		13.01.11
APPD	R.MURALI		18.01.11

DEPT	CODE	ALL DIMENSIONS ARE IN MM	PROJECTION	SCALE	WEIGHT (Kg)	REF TO ASSY / OLD DWG
PP	121			NTS	6.992	

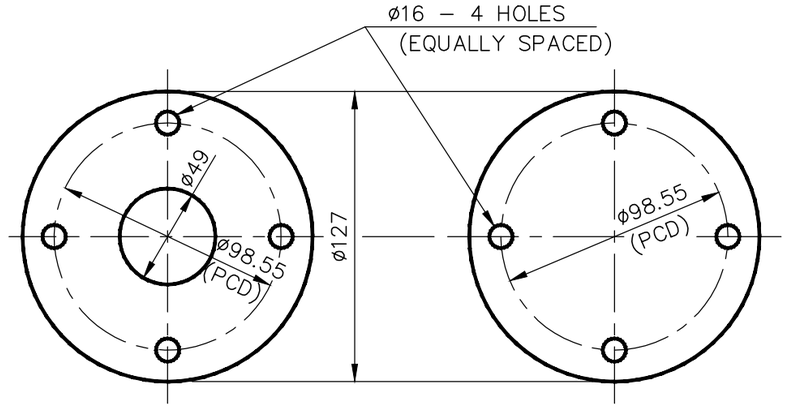
TITLE: PRESSURE T… ASSEMB… 515 REV 00

FOR TENDER PURPOSE ONLY

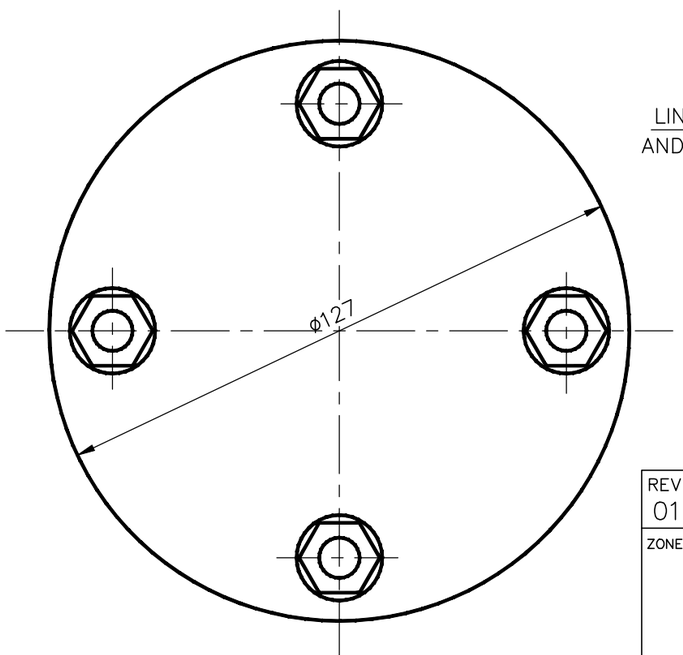
DRAWING NO: 3-09-002-00518

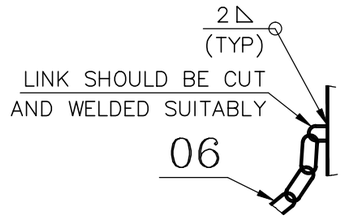


FOR TOLERANCES OF UNTOLERANCED DIMENSIONS DURING MANUFACTURE REFER PLANT STD.NO TP 023 0299



ITEM NO.02 ITEM NO.03





DETAIL– A

	06	LINK CHAIN –600MM D3x17x12				53 013 108			1	0.120
	05	NUT HEX GR.C M12	S	41304–12000		41304 00012			4	0.020
	04	BOLT HEX GR.C 4.6 M12x70	S	41221–12070		41221 12070			4	0.077
	03	FLANGE PL.25; D127				15 942 270 SA 387 GR 22 CL2	C		1	2.500
	02	FLANGE PL.25; D127				15 942 270 SA 387 GR 22 CL2	C		1	2.120
	01	TUBE D47.63x5 750 LONG				15 489 064 SA 213 T22	C		1	4.180
VARIANT NUMBER	ITEM NUMBER	DESCRIPTION	STD	DRAWING NUMBER	ITEM NO / VAR NO	MATERIAL CODE / MATERIAL SPECN	A/C/P	UNIT / DI	UNIT WEIGHT / QUANTITY	GS

REV	DATE	ALTERED :
01		CHD & APPD:
ZONE		

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TYPE OF PRODUCT OR NAME OF CUSTOMER/PROJECT

355–055

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

	NAME	SIGNATURE	DATE
DRN	R.MANI		12.01.11
CHD	R.MURALI		13.01.11
APPD	R.MURALI		19.01.11

DEPT	CODE	ALL DIMENSIONS ARE IN MM	PROJECTION	SCALE	WEIGHT (Kg)	REF TO ASSY / OLD DWG
PP	121			N.T.S.	9.308	

TITLE: SONIC TUBE LEAK DETECTION SYSTEM ASSE

DRAWING NO : 8

REV 00

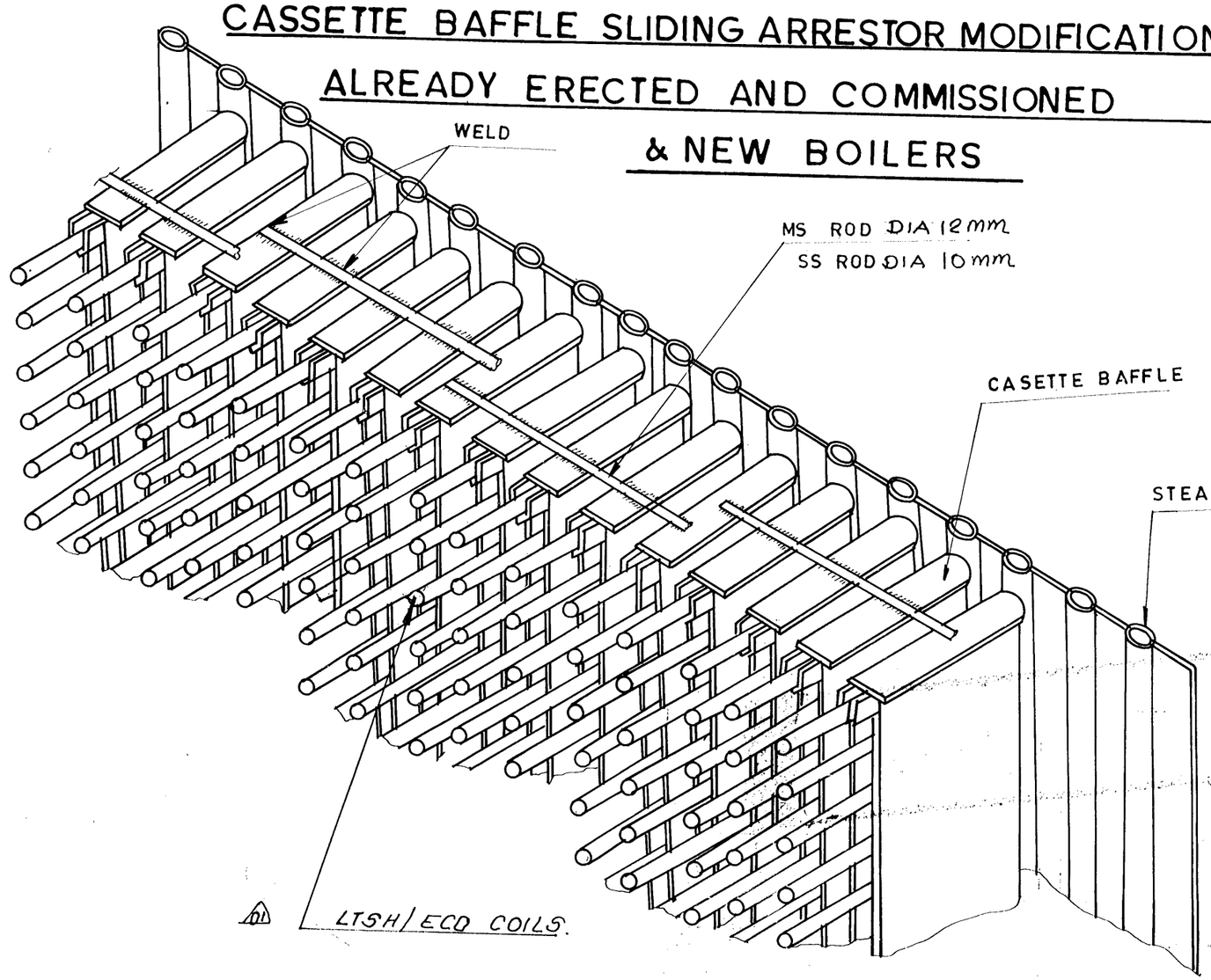
FOR TENDER PURPOSE ONLY

E-TENDER ENQUIRY NO.: PSER:PUR:BRH-S434:20 (ENQ:20:PP:0015:PUR:88) Date 05/03/2021.

DRAWING NO.

ALL DIMENSIONS ARE IN MILLIMETRES

CASSETTE BAFFLE SLIDING ARRESTOR MODIFICATION FOR ALREADY ERECTED AND COMMISSIONED & NEW BOILERS



NOTES:

M.S RODS TO BE USED FOR CASSETTE BAFFELS OF CARBON AND CARTON STEEL.

01 S.S ROD TO BE USED FOR OTHERS.

REV	DATE	ALTERED
01	17.5.93	CHECKED

DRG NOTES ADDED.

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TYPE OF PRODUCT
OR NAME OF
CUSTOMER/PROJECT

BHARAT HEAVY ELECTRICALS LTD.,
UNIT: HIGH PRESSURE BOILER PLANT.
TIRUCHIRAPALLI-620014.
05 - 229/D

	NAME	SIGN	DATE	NO. OF VAR.
DRN	TRK			
CHD	KRS		1/7/91	
APPD	KRS			

DEPT	GRADE OF UNTOL. DIM	SCALE	WEIGHT (KG).	REF. TO ASSY/OLD DRG.	ITEM NO.	NO. OF ITEMS
PP	C / M / F	NTS				
CODE 121						

TITLE: CASSETTE BAFFLE SLIDING ARRESTOR ARRANGEMENT

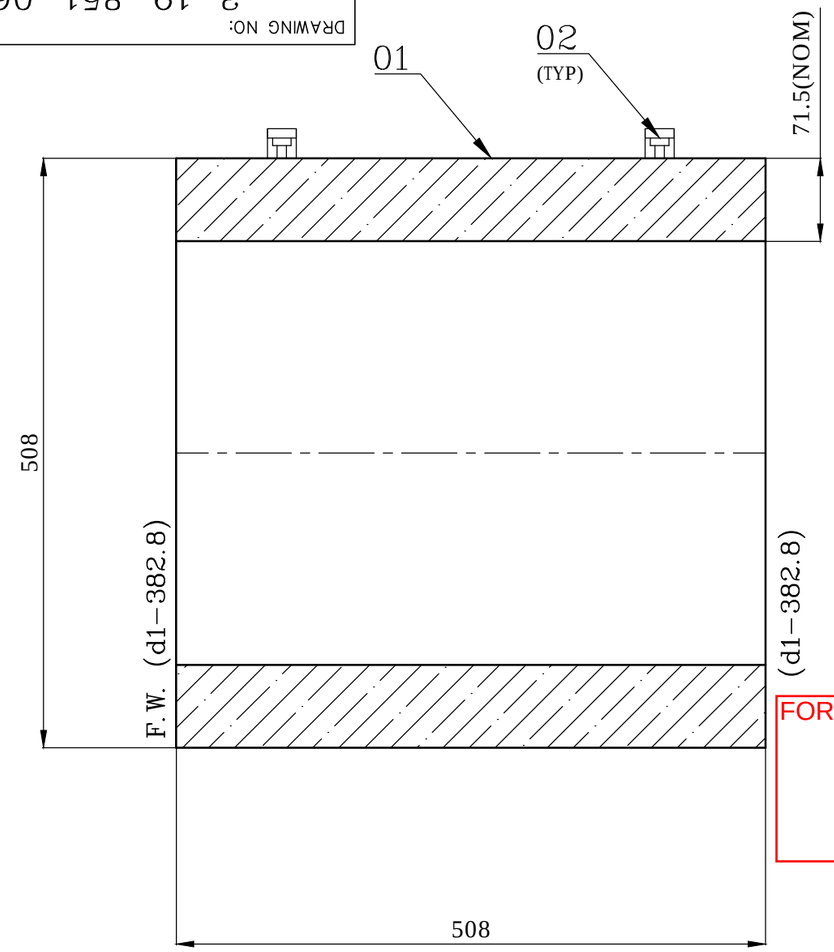
CARD CODE | DRAWING NO. | REV 01

FOR TENDER PURPOSE ONLY

Size, A3

CORPORATE DRG ID:TP-DG-3-19-851-06805/00

DRAWING NO: 3-19-851-06805



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

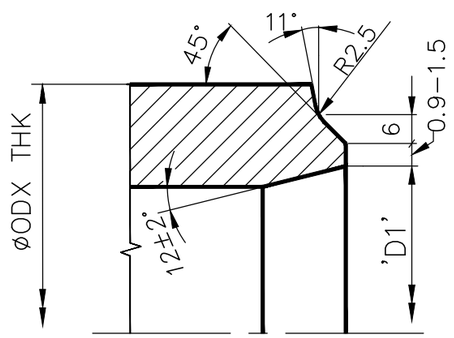
NOTES:

01. DESIGN, MANUFACTURE AND INSPECTION AS PER IBR.
02. DESIGN PRESSURE : 297.9 kg/sq.cm (g)
03. DESIGN TEMPERATURE : 348.8 deg c
04. F.W. DENOTES FIELD WELD REFER DETAIL –P FOR FW.
05. ALL. CAST NOS. AND INSPECTION MARKS TO REMAIN VISIBLE AT ALL TIMES.
06. END PREPARATION FOR SITE WELDING TO BE DONE AT SHOP AND TO BE SUITABLY PROTECTED WHILE SHIPPING.
07. PAINT MARK NO 'EF–01–SPPOL'
08. N.D.T.: RADIOGRAPHY AS PER I.B.R. FOR F.W. JOINTS AT SITE.
09. SITE CAN CUT EXISTING ECO OUTLET LINK EF–01–03 (DRAWING NO 1–19–851–02108) BY 150 MM AND LIFT THE ECO OUTLET HDR BY 350MM THEN WELD THIS SUPPLIED SPOOL PIPE AFTER EP IN EXISTING LINK (EF–01).

	02	RG PLUG		6108-0022		943310080000	C		0.160	
					01	SA105			2	
		PIPE D508X71.5(N) THK				150834314000	A		390.900	
						SA106GRC			1	
			STD	DRAWING NUMBER	ITEM NO	MATERIAL CODE	A/C/P	UNIT	UNIT WEIGHT	KG
					VAR NO	MATERIAL SPECN		DI	QUANTITY	

FOR TENDER PURPOSE ONLY

ECO OUTLET LINK SPOOL
(MARK NO EF-01-SPOOL)



DETAIL-P

REV	DATE	ALTERED :
01		CHD & APPD:
ZONE		

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TYPE OF PRODUCT OR NAME OF CUSTOMER/PROJECT

BARH I(MODIFICATION)–1x660 MW
CUST NO– 1700

Bharat Heavy Electricals Ltd
UNIT: HIGH PRESSURE BOILER PLANT
TIRUCHIRAPALLI – 620014
355–055

	NAME	SIGNATURE	DATE
DRN	AK DIXIT		09.10.2018
CHD	AK DIXIT		09.10.2018
APPD	SAK		09.10.2018

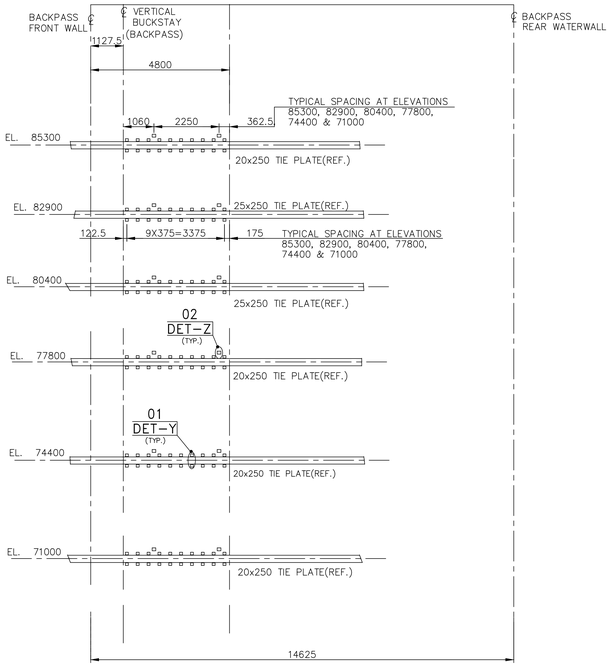
DEPT	CODE	ALL DIMENSIONS ARE IN MM	PROJECTION	SCALE	WEIGHT (Kg)	REF TO ASSY / OLD DWG
PP	121			NTS	391.220	1-19-851-02108

TITLE	DRAWING NO :	REV
ECO OUTLET LINK SPOOL (MARK NO EF-01-SPOOL)	3–19–851–06805	00

CORPORATE DRG ID:TP-DG-3-19-851-06805/00

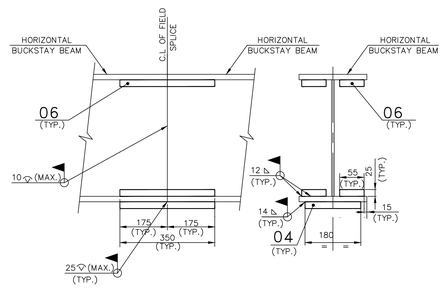
E-TENDER ENQUIRY NO.: PSER:PUR:BRH-S434:20 (ENQ:20:PP:0015:PUR:88) Date 05/03/2021.

DRAWING NO. 0-08-901-06210

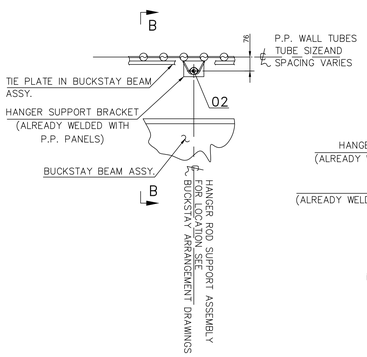


BACKPASS RIGHT SIDE ELEVATION

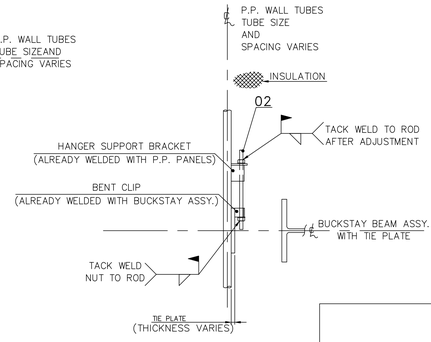
FOR TENDER PURPOSE ONLY



DETAILS OF HORIZONTAL FIELD JOINT
FOR (EL. 82900 & 80400)

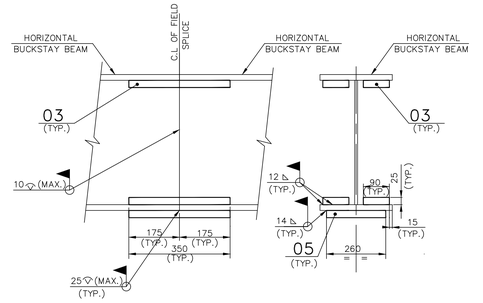


DETAIL–Z
(TYPICAL FOR ALL ELVATIONS)

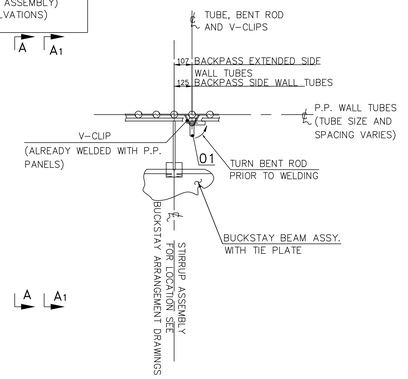


SECTION B–B
(HANGER ROD SUPPORT ASSEMBLY)
(TYPICAL FOR ALL ELVATIONS)

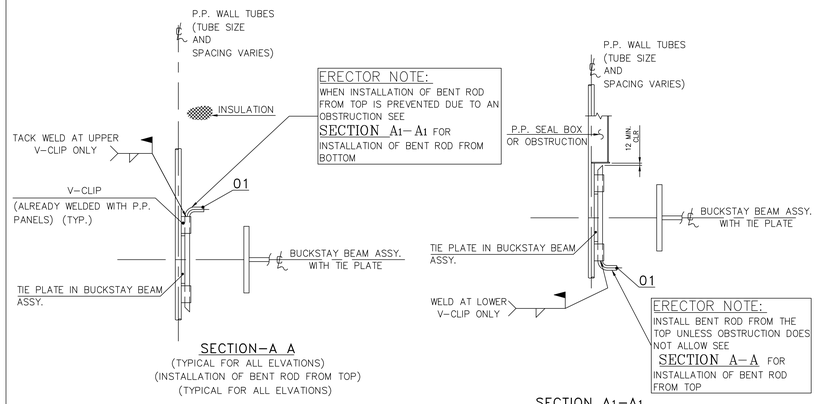
FOR TOLERANCES OF UNTOLERANCED DIMENSIONS DURING MANUFACTURE REFER PLANT STD. NO TP 023 0299



DETAILS OF HORIZONTAL FIELD JOINT
FOR (EL. 71000, 74400, 77800 & 85300)



DET–Y
V–CLIP WELDED TO PRESSURE PART TUBE FINS
(TYPICAL FOR ALL ELVATIONS UNLESS NOTED)



SECTION–A A
(TYPICAL FOR ALL ELVATIONS)
(INSTALLATION OF BENT ROD FROM TOP)
(TYPICAL FOR ALL ELVATIONS)

SECTION A1–A1
INSTALLATION OF BENT ROD FROM BOTTOM
FOR INFORMATION NOT SHOWN SEE SECTION A–A

TYPE OF WELD	TYPE OF ELECTRODE	LENGTH/NO.OF WELDS
5 (SITE)	E 8018 B2	75 M
6 (SITE)	E 8018 B2	62 M.

NOTES:

01. ITEM NOS 01,02,03 & 06 RELEASED SLIGHTLY IN EXCESS QUANTITY TO ALLOW FOR LOSS DURING HANDLING
02. SITE TO FOLLOW SUITABLE PROCEDURE FOR PRE HEAT, POST WELD HEAT AND ELECTRODE FOR WELDING OF SCALLOPED BAR & VERTICAL SUPPORT PLATE(VRSP)

03. ITEM NOS 07 & 08 SHALL BE USED FOR JOINT BETWEEN EXTENDED PASS WALL AND BACKPASS RIGHT SIDE WALL BEAM.

	ITEM NUMBER	DESCRIPTION	STD	DRAWING NUMBER	ITEM NO / VAR NO	MATERIAL CODE / MATERIAL SPECN	A/P	UNIT / DI	UNIT WEIGHT / QUANTITY	SOC	ZONE
#	08	WASHER M 24				414180002400		NO	0.030		
								L	40		
#	07	HSS BOLT & NUT M 24 X 70				412402407000		NO	0.531		
								L	40		
	06	PLATE 25 55 X 350				150110810000		NO	3.777		
						IS2062Fe410B			8		
	05	PLATE 25 260 X 350				150110810000		NO	17.858		
						IS2062Fe410B			4		
	04	PLATE 25 180 X 350				150110810000		NO	12.363		
						IS2062Fe410B			2		
	03	PLATE 25 90 X 350				150110810000		NO	6.180		
						IS2062Fe410B			16		
	02	HANEGR ROD ASSEMBLY		3-08-000-03117				NO	1.304		
						WELDMENT		M	16		
	01	BENT ROD		4-08-000-03410		150393620000		NO	2.400		
						SA182GR.F12		L	66		

REV	DATE	ALTERED :
01		CHD & APPD :
ZONE		

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TYPE OF PRODUCT OR NAME OF CUSTOMER/PROJECT

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

	NAME	SIGNATURE	DATE
DRN	PAWAN		15.03.18
CHD	DHANAJI		16.03.18
APPD	R.JPETER		16.03.18

DEPT ST | CODE 122 | ALL DIMENSIONS ARE IN MM | PROJECTION | SCALE N.T.S | WEIGHT (Kg) 426.958

REF TO ASSY / OLD DWG
ALSTOM DRG. NO. 00108–1E2962
BHEL DRG. NO. 0–08–901–02195

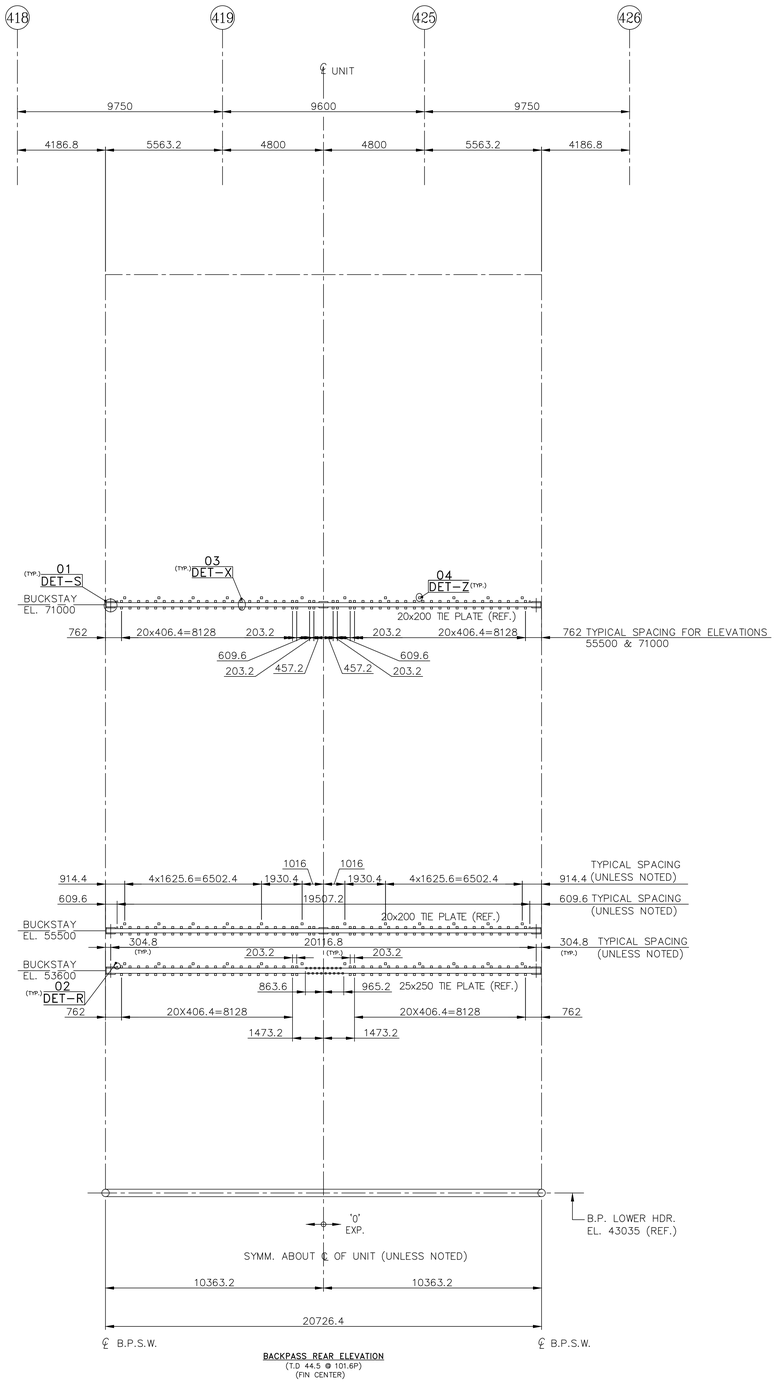
TITLE ASSEMBLY OF FURNACE UPPER KEY BUCKSTAYS (BACK PASS SIDE WALL)

DRAWING NO : 0–08–901–06210 | REV

E-TENDER ENQUIRY NO.: PSER:PUR:BRH-S434:20 (ENQ:20:PP:0015:PUR:88) Date 05/03/2021.

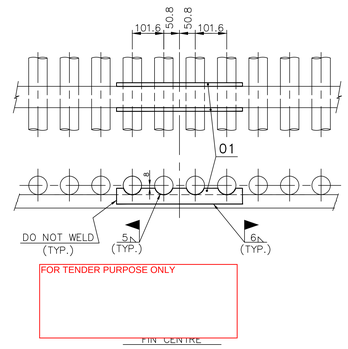
DRAWING NO. 0-08-901-06211

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

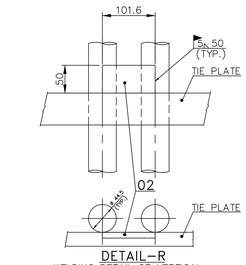


BACKPASS REAR ELEVATION
(T.D 44.5 @ 101.6P)
(FIN CENTER)

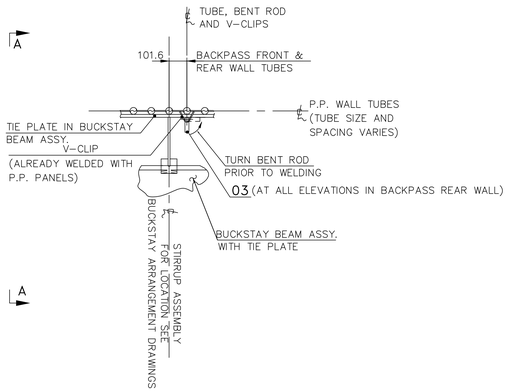
TYPE OF WELD	TYPE OF ELECTRODE	LENGTH/NO.OF WELDS
5 (SITE)	E 8018 B2	83 M
6 (SITE)	E 8018 B2	67 M.



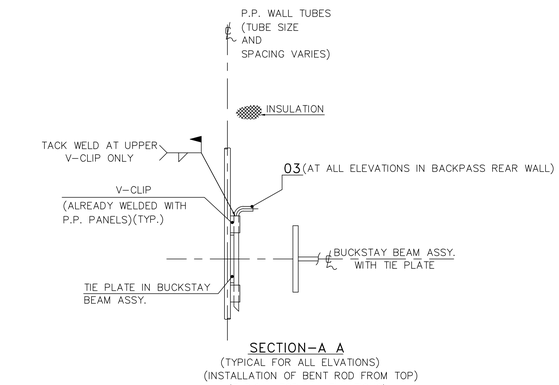
(TYPICAL FOR ALL ELVATIONS IN BACK PASS REAR WALL UNLESS NOTED)



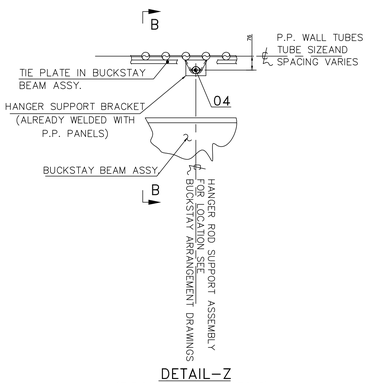
DETAIL–R
WELDING DETAIL OF VERTICAL SUPPORT PLATES
(TUBE D 44.5)
(TYPICAL FOR ALL ELVATIONS IN BACK PASS REAR WALL UNLESS NOTED)



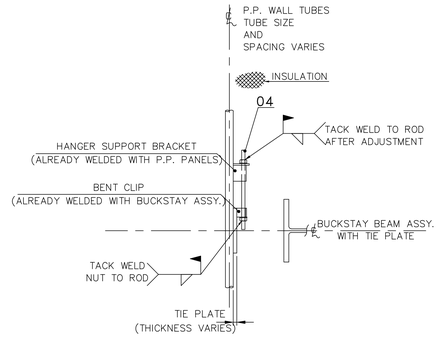
DET–X
V–CLIP WELDED TO PRESSURE PART TUBE FINS
(TYPICAL FOR ALL ELVATIONS UNLESS NOTED)



SECTION–A A
(TYPICAL FOR ALL ELVATIONS)
(INSTALLATION OF BENT ROD FROM TOP)
(TYPICAL FOR ALL ELVATIONS)



DETAIL–Z
(TYPICAL FOR ALL ELVATIONS)



SECTION B–B
(HANGER ROD SUPPORT ASSEMBLY)
(TYPICAL FOR ALL ELVATIONS)

ITEM NUMBER	DESCRIPTION	STD	DRAWING NUMBER	ITEM NO	MATERIAL CODE	UNIT	UNIT WEIGHT	QTY
04	HANGER ROD ASSEMBLY		3–08–000–03117			NO	1.304	
					WELDMENT	M	40	
03	BENT ROD		4–08–000–03410		150393620000	NO	2.400	
					SA182GR.F12	L	150	
02	PLATE 6 ; 50 X 101.6 VRSP(T.D 50.8 @ 101.6 P)				159422770000	NO	0.239	
					SA387GR12CL2	L	8	
01	SCALLOPED BAR (TUBE D 44.5)		4–08–000–03415		159422770000	NO	0.435	
					SA387GR12CL2	L	12	

NOTES:

01. ITEM NOS 02, 03, & 04 RELEASED SLIGHTLY IN EXCESS QUANTITY TO ALLOW FOR LOSS DURING HANDLING
02. SHEAR PADS, V–CLIPS, HANGER SUPPORT BRACKET ARE ALREADY WELDED WITH PRESSURE PART PANELS
03. SITE TO FOLLOW SUITABLE PROCEDURE FOR PRE HEAT, POST WELD HEAT AND ELECTRODE FOR WELDING OF SCALLOPED BAR & VERTICAL SUPPORT PLATE (VRSP)

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TYPE OF PRODUCT
OR NAME OF
CUSTOMER/PROJECT

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

	NAME	SIGNATURE	DATE
DRN	PAWAN		15.03.18
CHD	DHANAJI		16.03.18
APPD	R.JEPETER		16.03.18

REV	DATE	ALTERED :
01		CHD & APPD :
ZONE		

DEPT ST | CODE 122 | ALL DIMENSIONS ARE IN MM | PROJECTION | SCALE N.T.S | WEIGHT (Kg) 419.292

REF TO ASSY / OLD DWG
ALSTOM DRG. NO. 00108–1E2963
BHEL DRG. NO. 0–08–901–02196

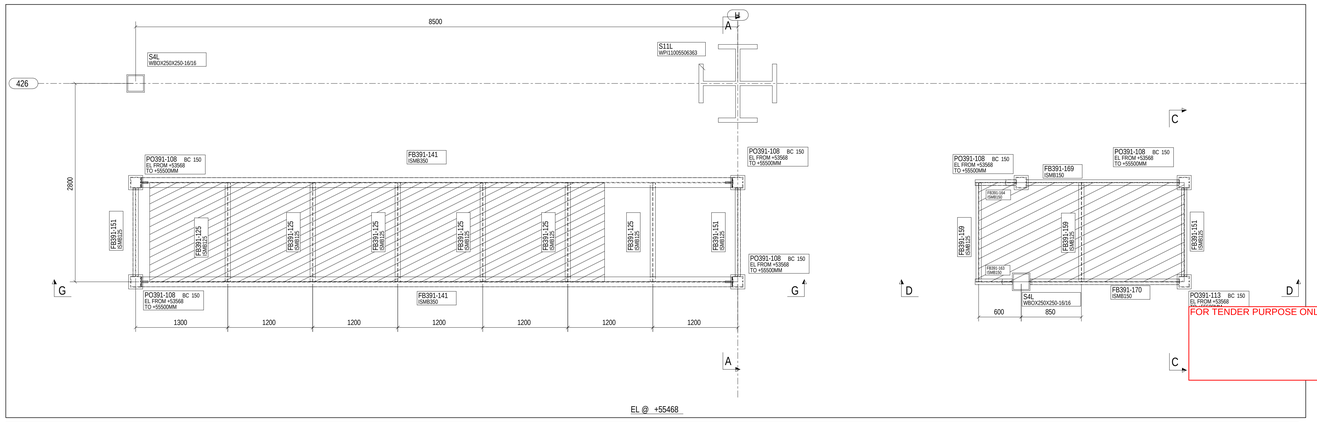
TITLE: ASSEMBLY OF FURNACE UPPER KEY BUCKSTAYS (BACKPASS REAR WALL)

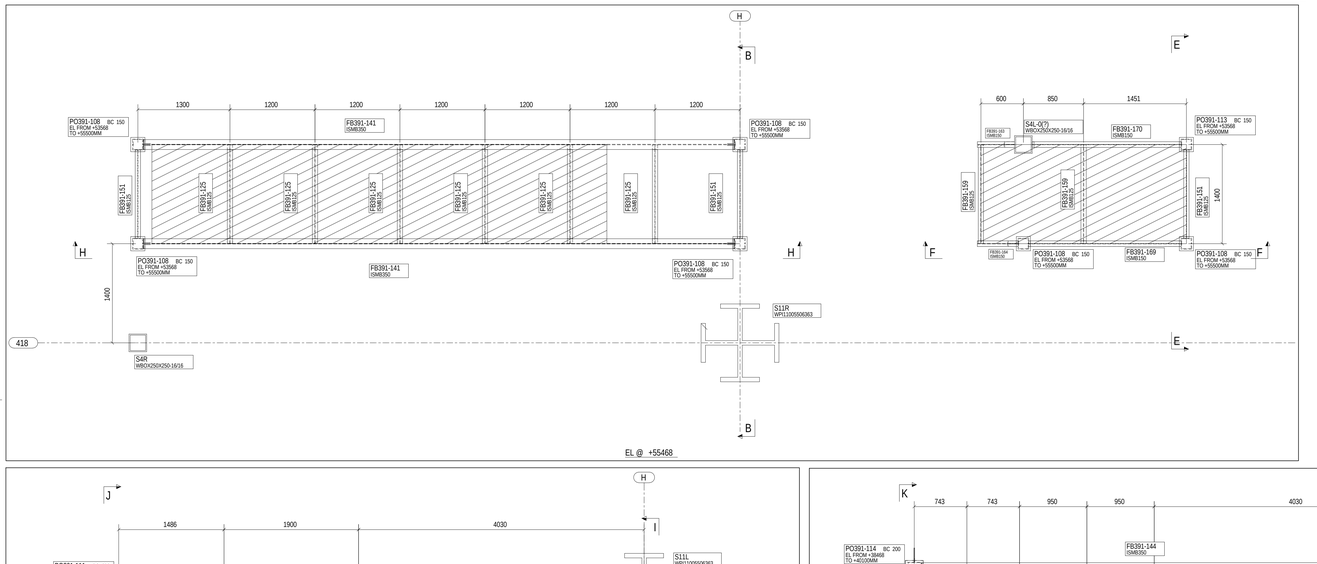
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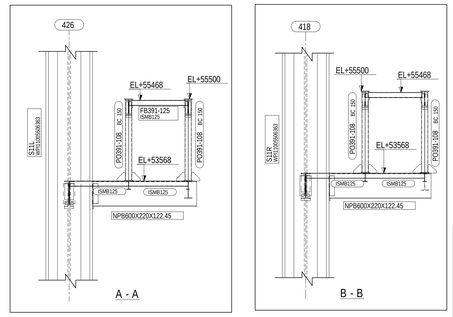
CORPORATE DRG ID:TP-DG-0-36-391-25583/00

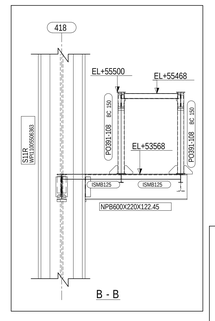
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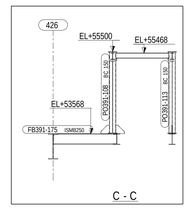
FOR TOLERANCES OF UNTOLERANCED DIMENSIONS DURING MANUFACTURE REFER PLANT STD. NO TP-322-0209

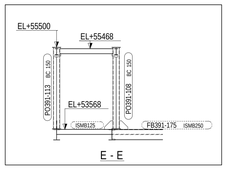


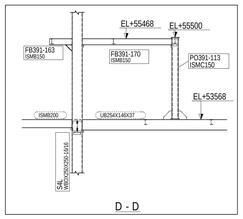


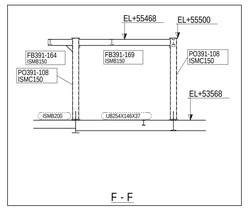


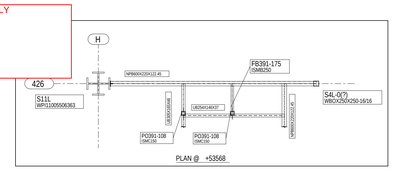


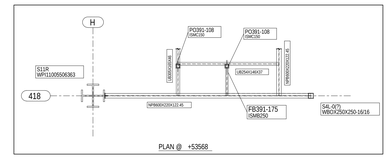


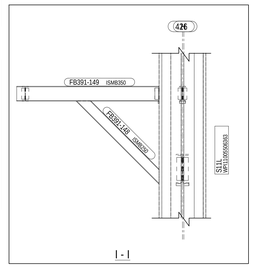


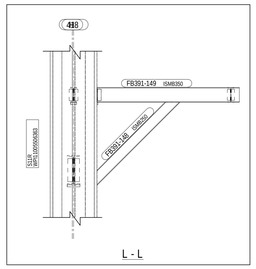












LEGEND:

T.O.S - TOP OF STEEL

T.O.F - TOP OF FLOOR

NOTES:

1) MATERIALS,OTHER REQUIREMENTS ARE AS PER BOILER ONLY

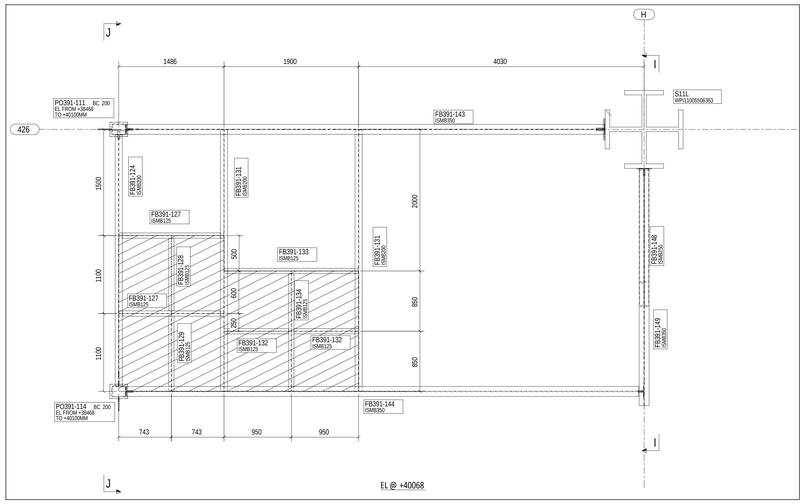
2) MANUFACTURING REQUIREMENTS SHOULD BE DONE AS PER RELEVANT QCP

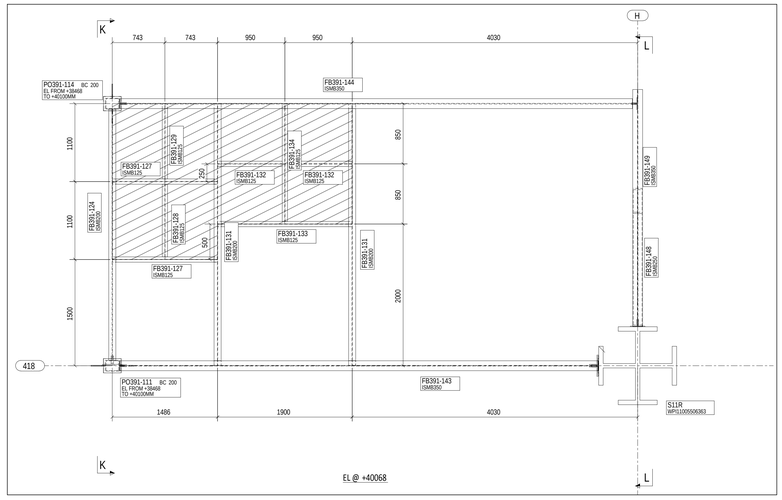
3) MARK NUMBER WITH FB391-XXX & PO391-XXX ARE ONLY RELEASED IN THIS PGMA. OTHERS ARE EXISTING

4) FOR MFG & WELD DETAILS REFER STANDARD DRG NOS:
- 3-35-110-00995 - FOR PRODUCTION NOTES.
- 0-35-311-15788 - FOR BEAMS,POST & HANGERS
- 3-35-110-02828 - FOR FABRICATION TOLERANCE
- 3-35-440-00697 - FOR WELDING DETAILS OF WB,WBOX.

5) WHEREVER GUSSET PLATES, STIFFENERS ARE INTERFERING WITH BEAMS, COLUMNS OR ANY MEMBER IT IS TO BE TRIMMED SUITABLY AT SITE .

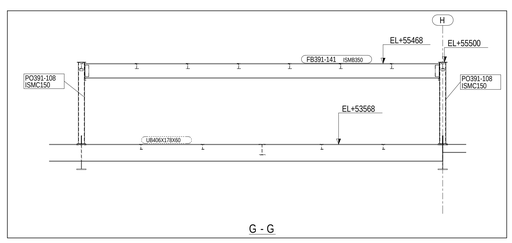
6) ALL THE LEVELS INDICATING IN THIS DRAWING REPERSENTS TOP OF STEEL UNLESS OTHERWISE MENTIONED.

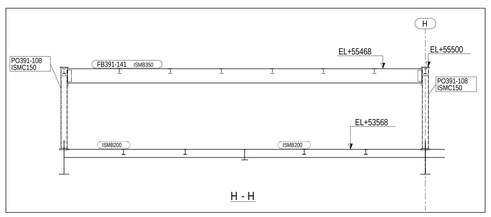


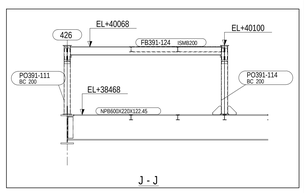


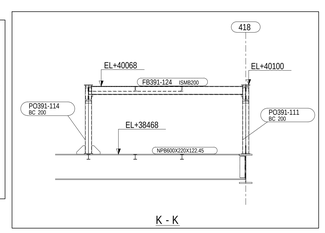
SL NO	DESCRIPTION	STD	DRAWING NUMBER	ITEM NO	MATERIAL CODE	AUOM	UNIT WEIGHT	QTY	ZONE
25	PO391-114 BC200		2-36-391-A9827			No	87.276	2	
24	PO391-113 BC150		2-36-391-A9826			No	77.628	2	
23	PO391-111 BC200		2-36-391-A9825			No	87.276	2	
22	PO391-108 BC150		2-36-391-A9823			No	77.594	12	
21	FB391-175 ISMB250		2-36-391-A9818			No	55.534	2	
20	FB391-170 ISMB150		2-36-391-A9815			No	33.055	2	
19	FB391-169 ISMB150		2-36-391-A9814			No	33.805	2	
18	FB391-164 ISMB150		2-36-391-A9809			No	11.807	2	
17	FB391-163 ISMB150		2-36-391-A9808			No	11.057	2	
16	FB391-159 ISMB125		2-36-391-A9804			No	18.669	4	
15	FB391-151 ISMB125		2-36-391-A9796			No	18.168	6	
14	FB391-149 ISMB350		2-36-391-A9794			No	184.698	2	
13	FB391-148 ISMB350		2-36-391-A9793			No	103.047	2	
12	FB391-144 ISMB350		2-36-391-A9789			No	397.034	2	
11	FB391-143 ISMB350		2-36-391-A9788			No	372.854	2	
10	FB391-141 ISMB350		2-36-391-A9787			No	455.856	4	
9	FB391-134 ISMB125		2-36-391-A9780			No	22.669	2	
8	FB391-133 ISMB125		2-36-391-A9779			No	25.267	2	
7	FB391-132 ISMB125		2-36-391-A9778			No	12.636	2	
6	FB391-131 ISMB200		2-36-391-A9777			No	93.723	4	
5	FB391-129 ISMB125		2-36-391-A9775			No	14.629	2	
4	FB391-128 ISMB125		2-36-391-A9774			No	14.654	2	
3	FB391-127 ISMB125		2-36-391-A9773			No	19.809	4	
2	FB391-125 ISMB125		2-36-391-A9771			No	18.625	12	
1	FB391-124 ISMB200		2-36-391-A9770			No	92.031	2	

HANGET NUMBER / ITEM NUMBER









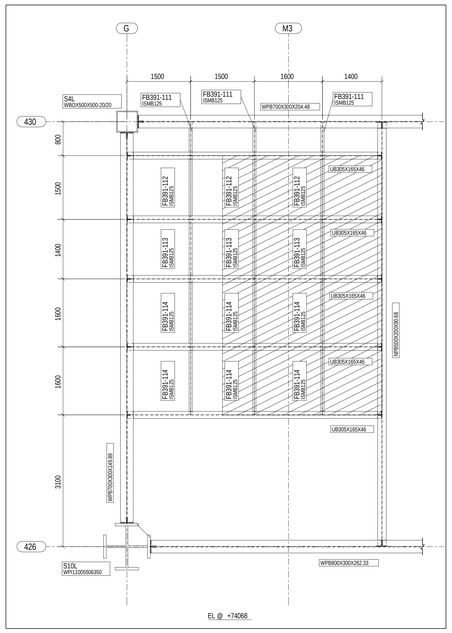
CAUTION: The information on this document is the property of BHARAT HEAVY ELECTRICALS LTD and it is not to be used directly or indirectly in any manner detrimental to the interest of the company.	TYPE OF PRODUCT OR NAME OF CUSTOMER/PROJECT		
	Bharat Heavy Electricals Ltd UNIT: HIGH PRESSURE BOILER PLANT TIRUCHIRAPALLI - 620014	DRN: PRIYAPRAKASH	09.11.2018
		CHD: YUVARAJ S	10.11.2018
		APPD: YUVARAJ S	12.11.2018
	DEPT: ST CODE: 122 ALL DIMENSIONS ARE IN MM PROJECTION SCALE: NTS WEIGHT (Kg): 6915.224	REF TO ASSY / OLD DWG	
	TITLE: BARH-II MODIFICATION ADDI. PLATFORM @ 40.1 & 55.5 M	DRAWING NO: 0-36-391-25583	REV: 0

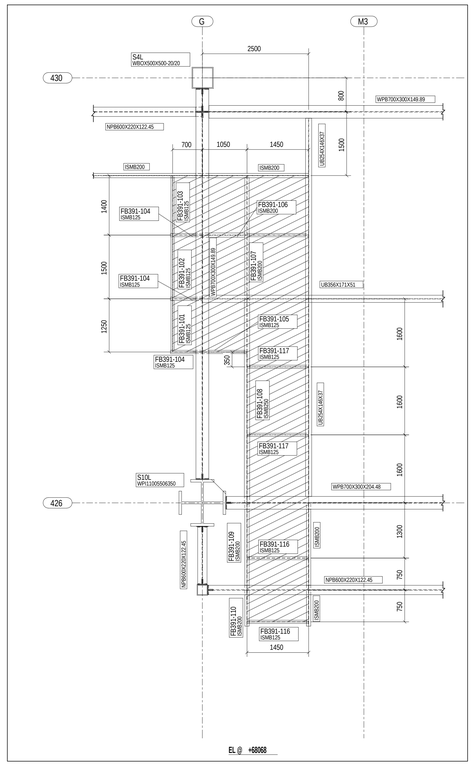
CORPORATE DRG ID:TP-DG-0-36-391-25583/00

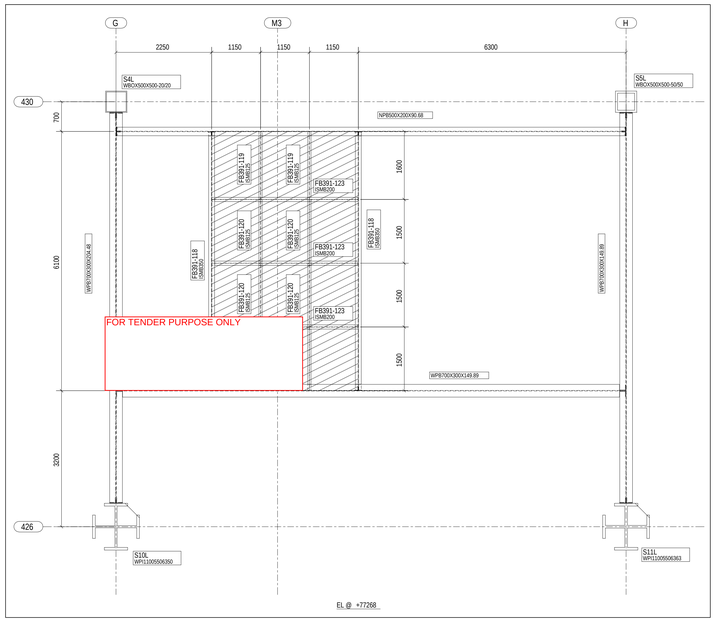
CORPORATE DRG ID:TP-DG-0-36-391-25584/00

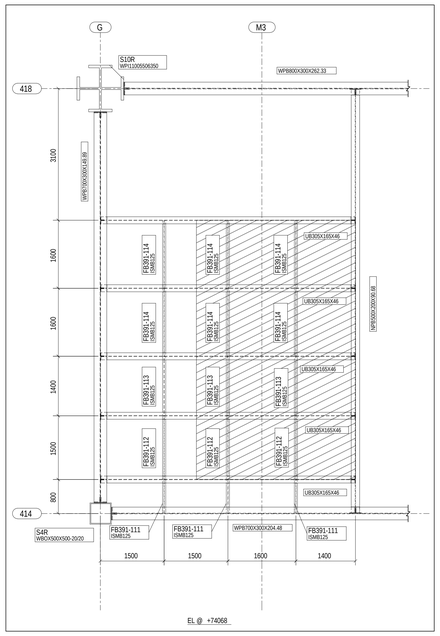
DRAWING NO: 0-36-391-25584

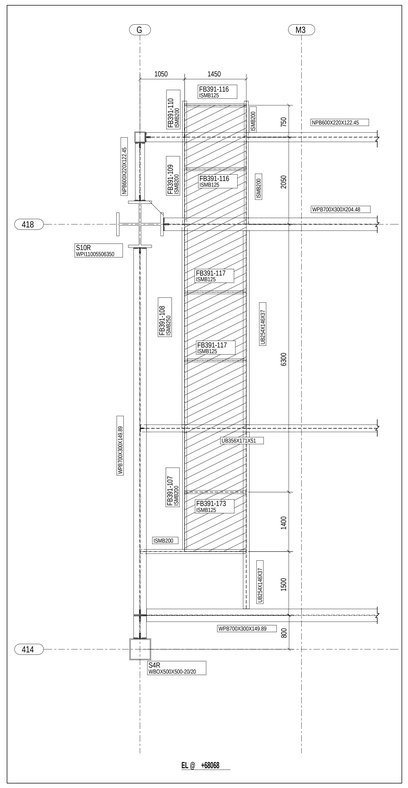
FOR TOLERANCES OF UNTOLERANCED DIMENSIONS DURING MANUFACTURE REFER PLANT STD. NO TP-322-0299

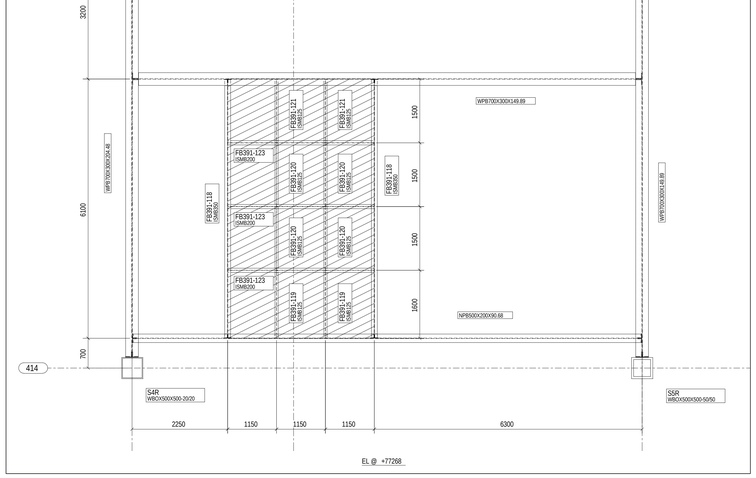












LEGEND:

T.O.S - TOP OF STEEL

T.O.F - TOP OF FLOOR

NOTES:

1) MATERIALS,OTHER REQUIREMENTS ARE AS PER BOILER ONLY

2) MANUFACTURING REQUIREMENTS SHOULD BE DONE AS PER RELEVANT QCP

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- 3-35-110-02828 - FOR FABRICATION TOLERANCE
- 3-35-440-00697 - FOR WELDING DETAILS OF WB,WBOX.

5) WHEREVER GUSSET PLATES, STIFFENERS ARE INTERFERING WITH BEAMS, COLUMNS OR ANY MEMBER IT IS TO BE TRIMMED SUITABLY AT SITE .

6) ALL THE LEVELS INDICATING IN THIS DRAWING REPERSENTS TOP OF STEEL UNLESS OTHERWISE MENTIONED.

SHOP/ERECT MARKING	ITEM NUMBER	DESCRIPTION	STD	DRAWING NUMBER	ITEM NO	MATERIAL CODE	AUOP	UNIT	UNIT WEIGHT	CC ZONE
					VAR NO	MATERIAL SPECN		DI	QUANTITY	
	23	FB391-173 ISMB125		2-36-391-A9817				No.	19.323 1	
	22	FB391-123 ISMB200		2-36-391-A9769				No.	87.373 4	
	21	FB391-121 ISMB125		2-36-391-A9768				No.	19.948 2	
	20	FB391-120 ISMB125		2-36-391-A9767				No.	19.997 3	
	19	FB391-119 ISMB125		2-36-391-A9766				No.	21.307 2	
	18	FB391-118 ISMB350		2-36-391-A9765				No.	328.492 4	
	17	FB391-117 ISMB125		2-36-391-A9764				No.	19.315 5	
	16	FB391-116 ISMB125		2-36-391-A9763				No.	19.327 4	
	15	FB391-115 ISMB125		2-36-391-A9762				No.	19.323 2	
	14	FB391-114 ISMB125		2-36-391-A9761				No.	21.323 12	
	13	FB391-113 ISMB125		2-36-391-A9760				No.	18.643 6	
	12	FB391-112 ISMB125		2-36-391-A9759				No.	19.983 6	
	11	FB391-111 ISMB125		2-36-391-A9758				No.	10.551 6	
	10	FB391-110 ISMB200		2-36-391-A9757				No.	25.171 2	
	9	FB391-109 ISMB200		2-36-391-A9756				No.	51.683 2	
	8	FB391-108 ISMB250		2-36-391-A9755				No.	178.557 2	
	7	FB391-107 ISMB200		2-36-391-A9754				No.	73.443 2	
	6	FB391-106 ISMB200		2-36-391-A9753				No.	26.382 1	
	5	FB391-105 ISMB125		2-36-391-A9752				No.	13.910 1	
	4	FB391-104 ISMB125		2-36-391-A9751				No.	13.709 1	
	3	FB391-103 ISMB125		2-36-391-A9750				No.	18.666 1	
	2	FB391-102 ISMB125		2-36-391-A9749				No.	20.014 1	
	1	FB391-101 ISMB125		2-36-391-A9748				No.	16.664 1	

CAUTION: The information on this document is the property of BHARAT HEAVY ELECTRICALS LTD and must be used directly or indirectly in any manner detrimental to the interests of the company.

TYPE OF PRODUCT
OR NAME OF
CUSTOMER/PROJECT

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

	NAME	SIGNATURE	DATE
DRN	PRSY&PRAKASH		09.11.2018
CHD	YUVARAJ.S		10.11.2018
APPD	YUVARAJ.S		12.11.2018

DEPT. ST | CODE 122 | 355-052 | ALL DIMENSIONS ARE IN MM | PROJECTION | SCALE NTS | WEIGHT (kg) 3701.832 | REF TO ASSY / OLD DWG

TITLE
BARH-II MODIFICATION ADDI.
PF @ 68.1,74.1 & 77.3M

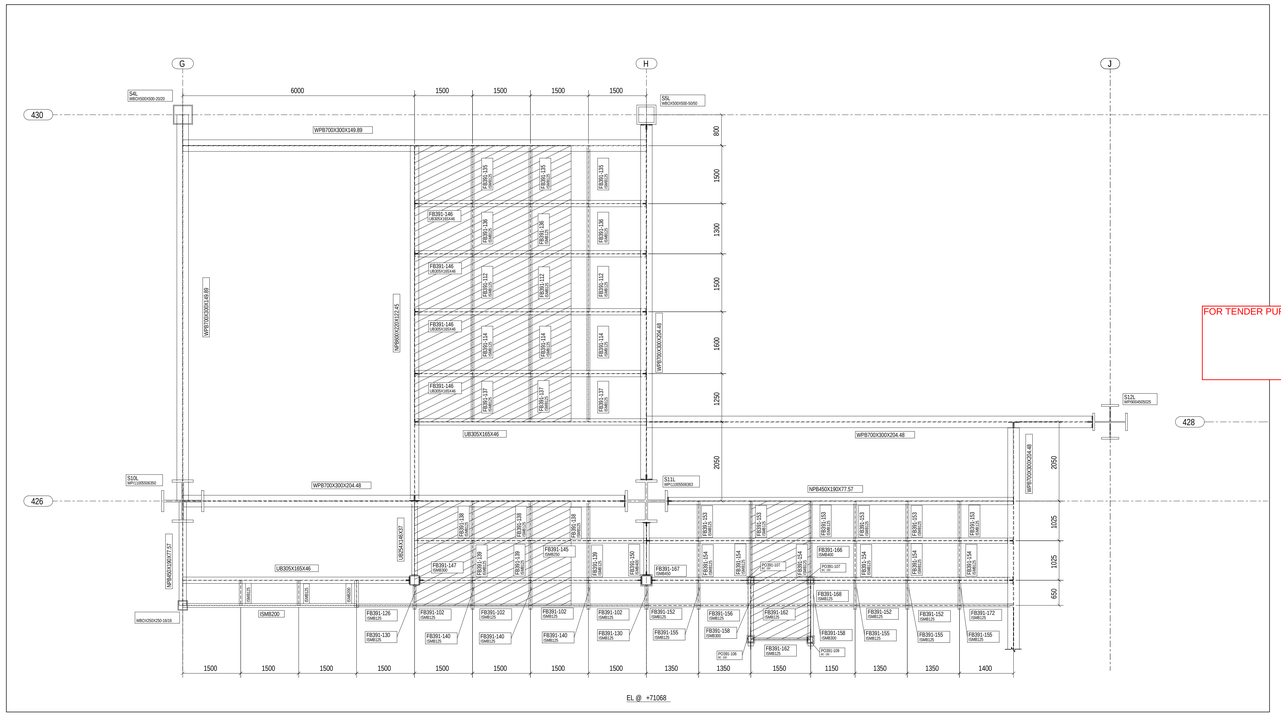
DRAWING NO.: 0-36-391-25584

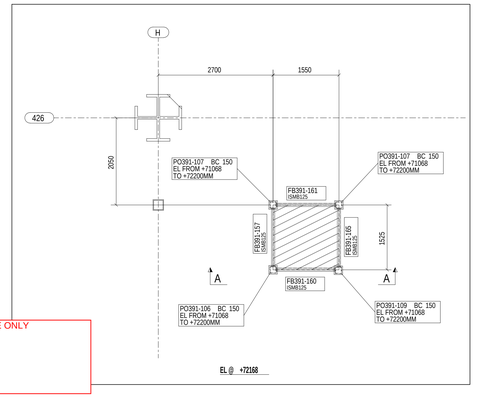
REV: 0

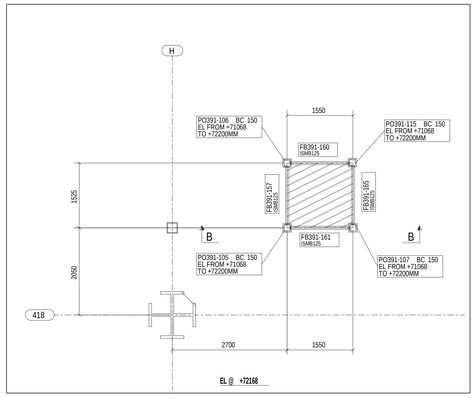
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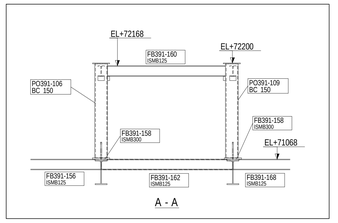
FOR TOLERANCES OF UNTOLERANCED DIMENSIONS DURING MANUFACTURE REFER PLANT STD. NO TP-322-0209

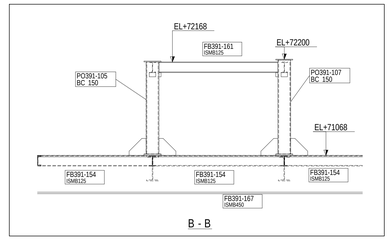


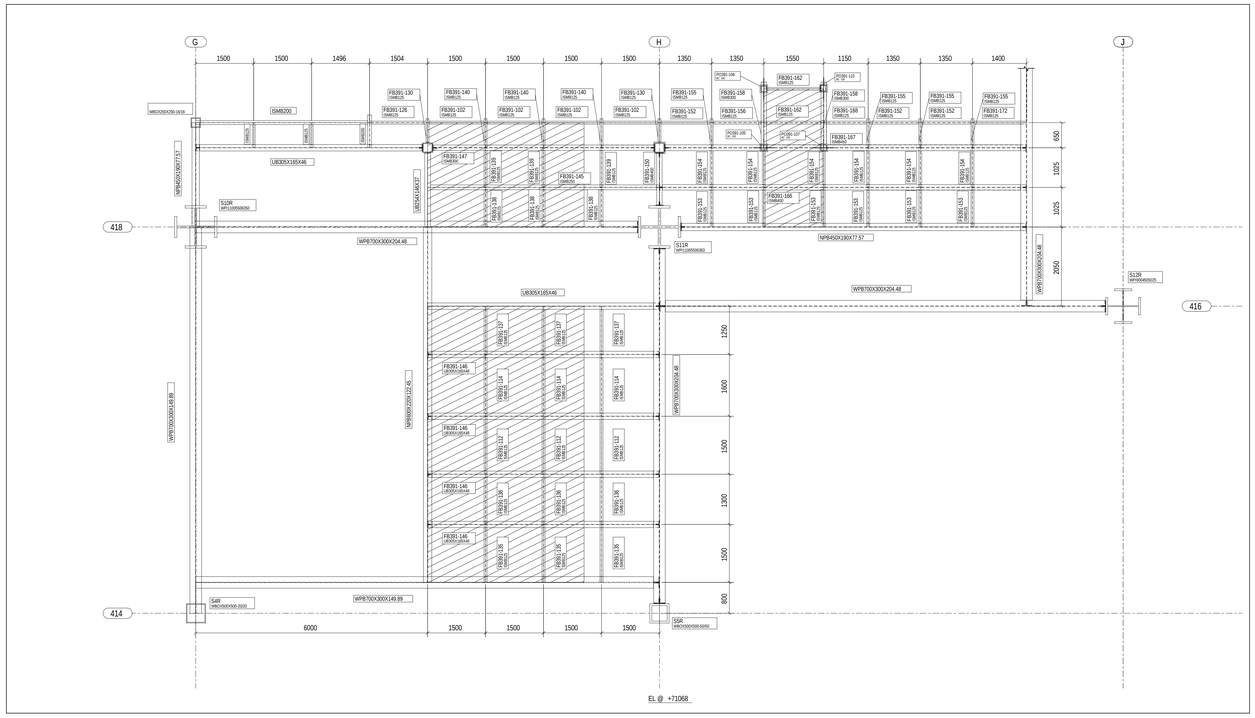




FOR TENDER PURPOSE ONLY







LEGEND:

T.O.S - TOP OF STEEL

T.O.F - TOP OF FLOOR

NOTES:

1) MATERIALS,OTHER REQUIREMENTS ARE AS PER BOILER ONLY

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WEIGHT NUMBER	ITEM NUMBER	DESCRIPTION	STD	DRAWING NUMBER	ITEM NO	MATERIAL CODE	AUOP	UNIT	UNIT WEIGHT	CC ZONE
					VAR NO	MATERIAL SPECN		DI	QUANTITY	
	36	PO391-115 BC150		2-36-391-A9828				No	50.731 2	
	35	PO391-109 BC150		2-36-391-A9824				No	50.714 2	
	34	PO391-107 BC150		2-36-391-A9822				No	50.748 2	
	33	PO391-106 BC150		2-36-391-A9821				No	50.714 2	
	32	PO391-105 BC150		2-36-391-A9820				No	50.009 2	
	31	PO391-104 WBOX250X250-16/16		2-36-391-A9819				No	412.251 2	
	30	FB391-172 ISMB125		2-36-391-A9816				No	18.607 2	
	29	FB391-168 ISMB125		2-36-391-A9813				No	15.303 2	
	28	FB391-167 ISMB450		2-36-391-A9812				No	700.131 2	
	27	FB391-166 ISMB400		2-36-391-A9811				No	595.383 2	
	26	FB391-165 ISMB125		2-36-391-A9810				No	20.011 2	
	25	FB391-162 ISMB125		2-36-391-A9807				No	20.643 4	
	24	FB391-161 ISMB125		2-36-391-A9806				No	20.205 2	
	23	FB391-160 ISMB125		2-36-391-A9805				No	20.038 2	
	22	FB391-158 ISMB300		2-36-391-A9803				No	80.095 4	
	21	FB391-157 ISMB125		2-36-391-A9802				No	19.843 2	
	20	FB391-156 ISMB125		2-36-391-A9801				No	17.983 2	
	19	FB391-155 ISMB125		2-36-391-A9800				No	14.127 8	
	18	FB391-154 ISMB125		2-36-391-A9799				No	13.586 12	
	17	FB391-153 ISMB125		2-36-391-A9798				No	13.586 12	
	16	FB391-152 ISMB125		2-36-391-A9797				No	18.004 6	
	15	FB391-150 ISMB400		2-36-391-A9795				No	105.904 2	
	14	FB391-147 ISMB300		2-36-391-A9792				No	280.474 2	
	13	FB391-146 UB305X165X46		2-36-391-A9791				No	283.784 8	
	12	FB391-145 ISMB250		2-36-391-A9790				No	223.442 2	
	11	FB391-140 ISMB125		2-36-391-A9786				No	12.296 6	
	10	FB391-139 ISMB125		2-36-391-A9785				No	13.612 6	
	9	FB391-138 ISMB125		2-36-391-A9784				No	13.565 6	
	8	FB391-137 ISMB125		2-36-391-A9783				No	16.633 6	
	7	FB391-136 ISMB125		2-36-391-A9782				No	17.303 6	
	6	FB391-135 ISMB125		2-36-391-A9781				No	19.941 6	
	5	FB391-130 ISMB125		2-36-391-A9776				No	9.098 4	
	4	FB391-126 ISMB125		2-36-391-A9772				No	20.006 2	
	3	FB391-114 ISMB125		2-36-391-A9761				No	21.323 6	
	2	FB391-112 ISMB125		2-36-391-A9759				No	19.983 6	
	1	FB391-102 ISMB125		2-36-391-A9749				No	20.014 8	

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TYPE OF PRODUCT
OR NAME OF
CUSTOMER/PROJECT

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

	NAME	SIGNATURE	DATE
DRN	PRIYAPRAKASH		09.11.2018
CHD	YUVARAJ S		10.11.2018
APPD	YUVARAJ S		12.11.2018

DEPT: ST (305-052)
CODE: 122
ALL DIMENSIONS ARE IN MM
PROJECTION
SCALE: NTS
WEIGHT (Kg): 9569.050
REF TO ASSY / OLD DWG

TITLE: BARH-II MODIFICATION ADDI. PLATFORM @ 71.1 M

DRAWING NO.: 0-36-391-25585

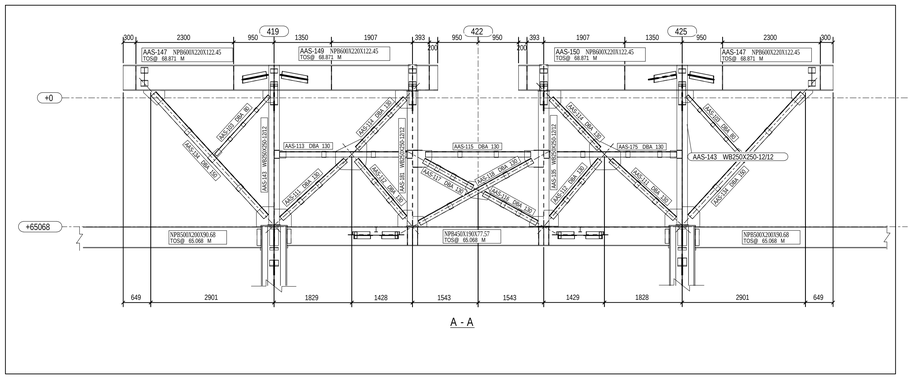
REV: 0

CORPORATE DRG ID:TP-DG-0-36-391-25585/00

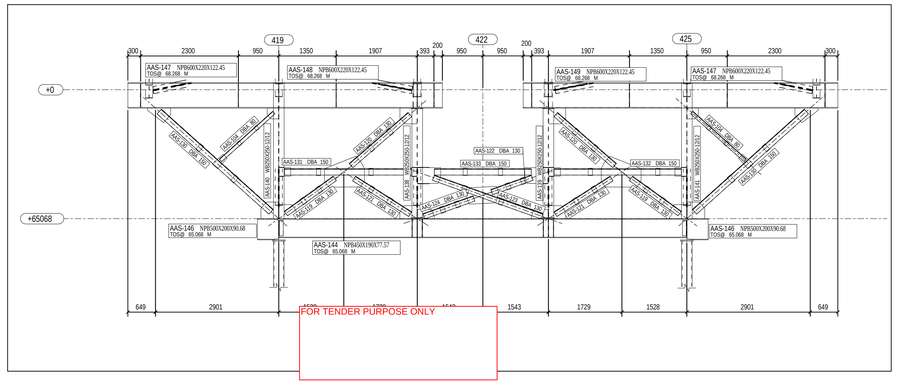
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DRAWING NO: 0-36-392-25686

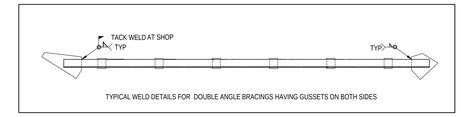
FOR TOLERANCES OF UNTOLERANCED DIMENSIONS DURING MANUFACTURE REFER PLANT STD. NO TP-322-0299



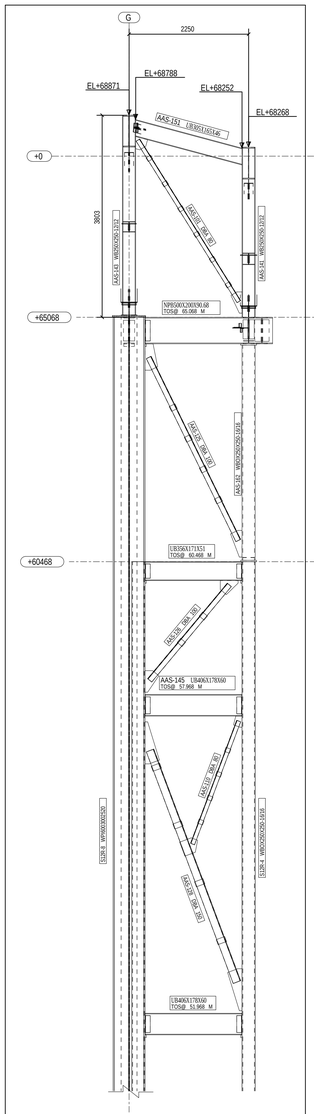
A - A



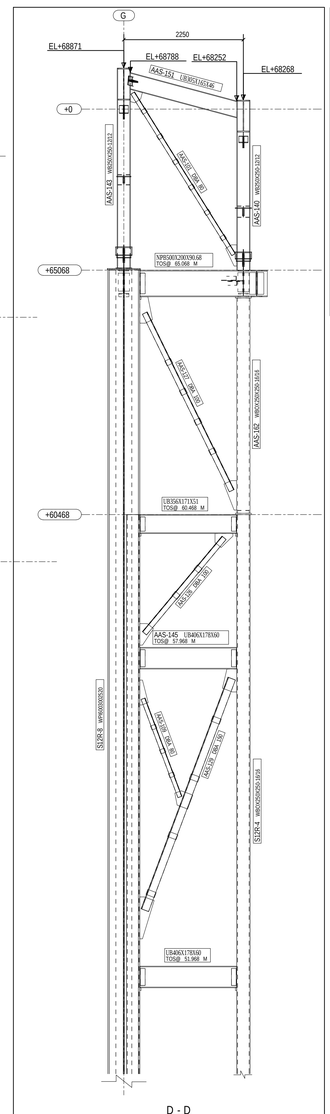
FOR TENDER PURPOSE ONLY



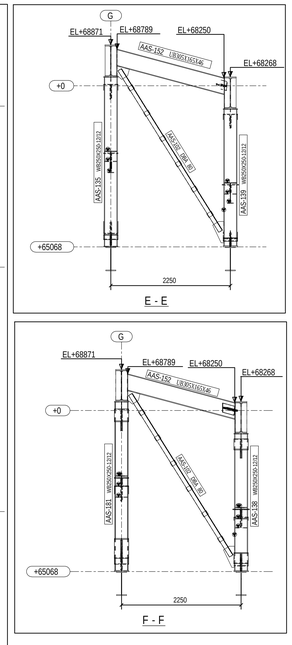
TYPICAL WELD DETAILS FOR DOUBLE ANGLE BRACINGS HAVING GUSSETS ON BOTH SIDES



C - C

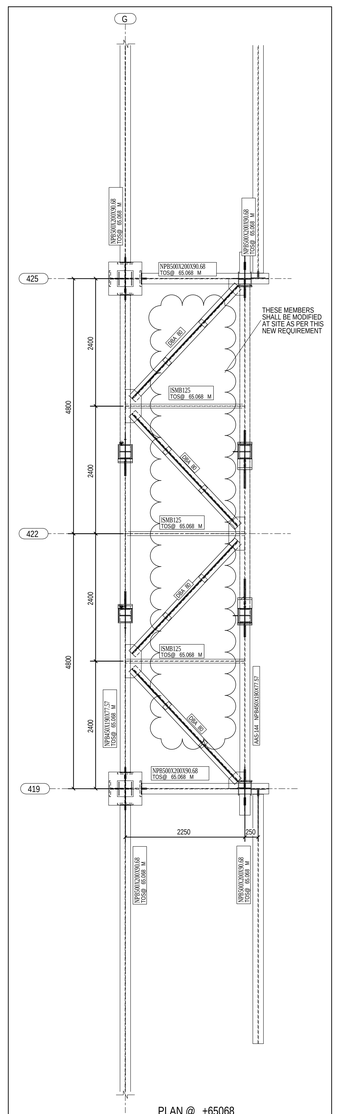


D - D

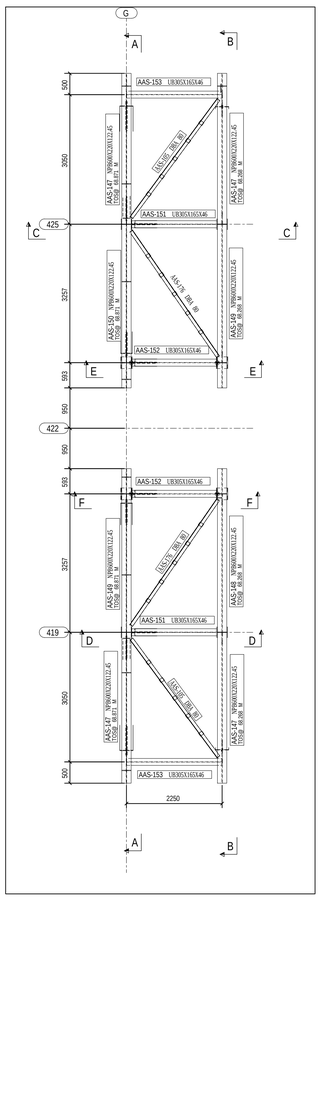


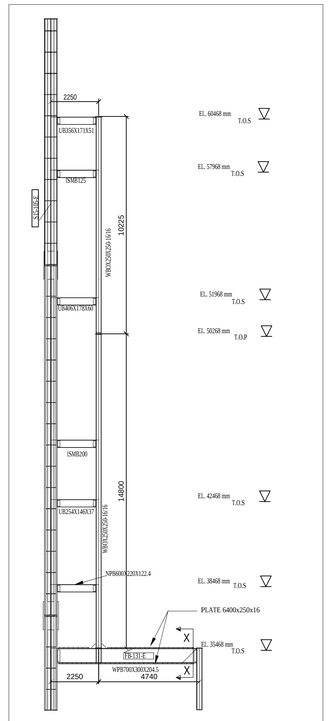
E - E

F - F

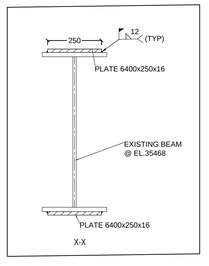


PLAN @ +65068





REFERENCE DRG:
0-36-740-10870 - POSTS AND HANGERS
0-36-331-10673 - ASSY. OF FLOOR PLAN AT EL. 35500
0-36-331-10675 - ASSY. OF FLOOR PLAN AT EL. 35500



LEGENDS:
T.O.S - TOP OF STEEL
EL - ELEVATION

NOTES:
1) MATERIALS,OTHER REQUIREMENTS ARE AS PER BOILER ONLY
2) MANUFACTURING REQUIREMENTS SHOULD BE DONE AS PER RELEVANT QCP
4) FOR MFG & WELD DETAILS REFER STANDARD DRG NOS:
3-35-110-00995 - - FOR PRODUCTION NOTES.
0-35-311-15788 - - FOR BEAMS,POST & HANGERS.
3-35-110-02828 - - FOR FABRICATION TOLERANCE
3-35-440-00697 - - FOR WELDING DETAILS OF WB,WBOX.
5) WHEREVER GUSSET PLATES, STIFFENERS ARE INTERFERING WITH BEAMS, COLUMNS OR ANY MEMBER IT IS TO BE TRIMMED SUITABLY AT SITE.
6) ALL THE LEVELS INDICATING IN THIS DRAWING REPERSENTS TOP OF STEEL UNLESS OTHERWISE MENTIONED.

SPECIAL NOTES:
1)FOR HORIZONTAL BRACING AAS-105,AAS-176 ITEM NO. 52 PLATE-10 TO BE USED AS GUSSET AT SITE
2)AAS-145 SHALL BE ERECTED IN PLACE OF EXISTING ISMB 125

SHEET NUMBER	ITEM NUMBER	DESCRIPTION	STD	DRAWING NUMBER	ITEM NO / VAR NO	MATERIAL CODE / MATERIAL SPECN	A/UP	UNIT	UNIT WEIGHT / QUANTITY	CG	ZONE
	53	PLATE-10mm 6400 x 250 x 16				15-011-026 IS2062Fe410A		No.	200.96 4		
	52	PLATE-10mm 2000 X 2000 X10				15-011-098 IS2062Fe410A		No.	314 3		
	51	AAS-181 WB250X250-12/12		1-36-392-32076				No.	309.996 1		
	50	AAS-176 DBA80X80X8		2-36-392-B2330				No.	72.622 2		
	49	AAS-175 PLT10*100		2-36-392-B2329				No.	176.760 2		
	48	AAS-162 WBO(X250X250-16/16		1-36-392-32074				No.	495.062 1		
	47	AAS-153 UB305X165X46		1-36-392-32073				No.	110.601 1		
	46	AAS-152 UB305X165X46		1-36-392-32072				No.	99.719 2		
	45	AAS-151 UB305X165X46		1-36-392-32071				No.	99.242 2		
	44	AAS-150 PLT10*200		1-36-392-32070				No.	511.898 1		
	43	AAS-149 PLT10*200		1-36-392-32069				No.	511.898 2		
	42	AAS-148 PLT10*200		1-36-392-32068				No.	517.306 1		
	41	AAS-147 NPB600X220X122.45		1-36-392-32067				No.	454.912 4		
	40	AAS-146 NPB500X200X90.68		1-36-392-32066				No.	44.797 2		
	39	AAS-145 UB406X178X60		1-36-392-32065				No.	128.153 1		
	38	AAS-144 NPB450X190X77.57		1-36-392-32064				No.	807.805 1		
	37	AAS-143 WB250X250-12/12		1-36-392-32063				No.	273.448 2		
	36	AAS-141 WB250X250-12/12		1-36-392-32061				No.	227.172 1		
	35	AAS-140 WB250X250-12/12		1-36-392-32060				No.	227.172 1		
	34	AAS-138 WB250X250-12/12		1-36-392-32059				No.	249.748 1		
	33	AAS-136 WB250X250-12/12		1-36-392-32058				No.	249.748 1		
	32	AAS-135 PLT10*90		1-36-392-32057				No.	302.081 1		
	31	AAS-134 DBA150X150X12		2-36-392-B2328				No.	242.692 2		
	30	AAS-133 DBA150X150X12		2-36-392-B2327				No.	127.048 1		
	29	AAS-132 DBA150X150X12		2-36-392-B2326				No.	207.880 2		
	28	AAS-131 DBA150X150X12		2-36-392-B2325				No.	207.880 2		
	27	AAS-130 DBA150X150X12		2-36-392-B2324				No.	220.379 2		
	26	AAS-129 DBA150X150X12		2-36-392-B2323				No.	282.916 2		
	25	AAS-128 DBA150X150X12		2-36-392-B2322				No.	285.500 2		
	24	AAS-127 DBA100X100X10		2-36-392-B2321				No.	126.627 2		
	23	AAS-126 DBA100X100X10		2-36-392-B2320				No.	81.521 2		
	22	AAS-125 DBA100X100X10		2-36-392-B2319				No.	130.830 2		
	21	AAS-124 DBA130X130X12		2-36-392-B2318				No.	61.292 2		
	20	AAS-123 DBA130X130X12		2-36-392-B2317				No.	150.574 2		
	19	AAS-122 DBA130X130X12		2-36-392-B2316				No.	49.648 2		
	18	AAS-121 DBA130X130X12		2-36-392-B2315				No.	75.853 2		
	17	AAS-120 DBA130X130X12		2-36-392-B2314				No.	88.425 2		
	16	AAS-119 DBA130X130X12		2-36-392-B2313				No.	78.573 2		
	15	AAS-118 DBA130X130X12		2-36-392-B2312				No.	160.094 2		
	14	AAS-117 DBA130X130X12		2-36-392-B2311				No.	63.970 1		
	13	AAS-116 DBA130X130X12		2-36-392-B2310				No.	69.543 1		
	12	AAS-115 DBA130X130X12		2-36-392-B2309				No.	118.815 1		
	11	AAS-114 DBA130X130X12		2-36-392-B2308				No.	78.823 2		
	10	AAS-113 DBA130X130X12		2-36-392-B2307				No.	175.583 2		
	9	AAS-112 DBA130X130X12		2-36-392-B2306				No.	85.520 2		
	8	AAS-111 DBA130X130X12		2-36-392-B2305				No.	109.455 2		
	7	AAS-110 DBA80X80X8		2-36-392-B2304				No.	52.099 2		
	6	AAS-109 DBA80X80X8		2-36-392-B2303				No.	43.587 2		
	5	AAS-106 DBA80X80X8		2-36-392-B2302				No.	70.105 2		
	4	AAS-104 DBA80X80X8		2-36-392-B2301				No.	38.583 2		
	3	AAS-103 DBA80X80X8		2-36-392-B2300				No.	43.244 2		
	2	AAS-102 DBA80X80X8		2-36-392-B2299				No.	79.823 2		
	1	AAS-101 DBA80X80X8		2-36-392-B2298				No.	79.903 2		

REV	DATE	ALTERED / CHD & APPD	ARAVINTHAN.S / S.YUVARAJ
01	31.01.19	VIEWS AND ITEM-53 ADDED	
ZONE			

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TYPE OF PRODUCT OR NAME OF CUSTOMER/PROJECT

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

	NAME	SIGNATURE	DATE
DRN			
CHD			
APPD			

DEPT	ALL DIMENSIONS ARE IN MM	PROJECTION	SCALE	WEIGHT (Kg)	REF TO ASSY / OLD DWG
ST			NTS	15875.84	
CODE 122					

TITLE: SUPPLEMENTAL STEEL FOR REA R ARCH FLOOR SUPPORT

DRAWING NO: 0-36-392-25686

REV: 01

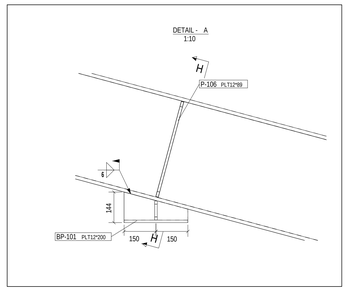
CORPORATE DRG ID:TP-DG-0-36-392-25686/01

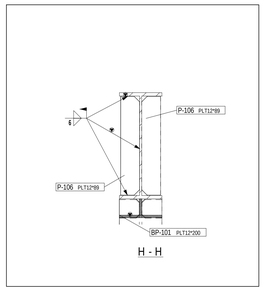
CORPORATE DRG ID:TP-DG-0-36-392-25687/00

DRAWING NO: 0-36-392-25687

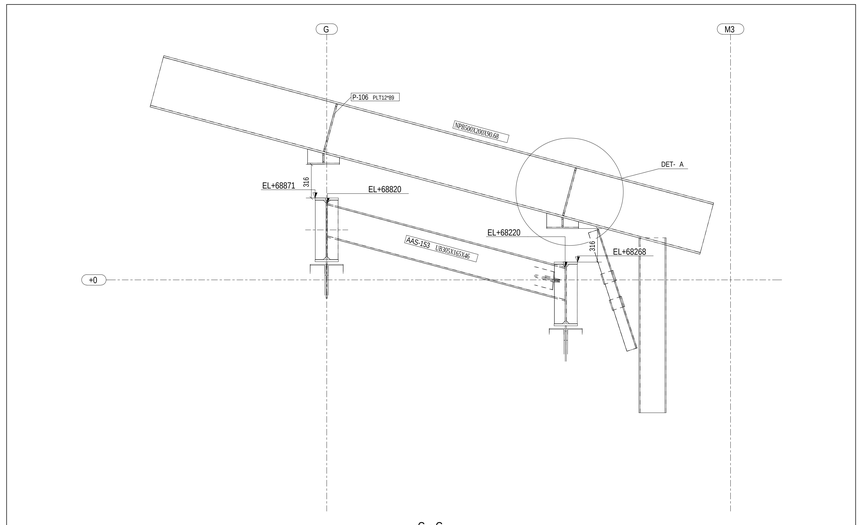
FOR TOLERANCES OF UNTOLERANCED DIMENSIONS DURING MANUFACTURE REFER PLANT STD. NO TP-322-0209

FOR TENDER PURPOSE ONLY

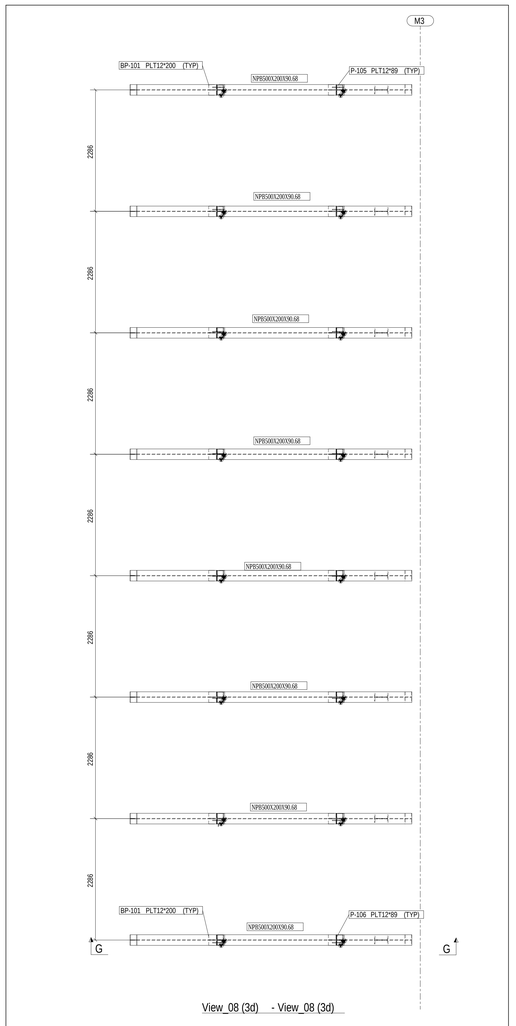




H - H



G - G



View_08 (3d) - View_08 (3d)

LEGEND:

T.O.S - TOP OF STEEL

EL - ELEVATION

NOTES:

1) MATERIALS,OTHER REQUIREMENTS ARE AS PER BOILER ONLY

2) MANUFACTURING REQUIREMENTS SHOULD BE DONE AS PER RELEVANT QCP

3) MARK NUMBER WITH FB391-XXX & PO391-XXX ARE ONLY RELEASED IN THIS PGMA. OTHERS ARE EXISTING

4) FOR MFG & WELD DETAILS REFER STANDARD DRG NOS:
3-35-110-00995 - FOR PRODUCTION NOTES.
0-35-311-15788 - FOR BEAMS,POST & HANGERS
3-35-110-02928 - FOR FABRICATION TOLERANCE
3-35-440-00697 - FOR WELDING DETAILS OF WB,WBOX.

5) WHEREVER GUSSET PLATES, STIFFENERS ARE INTERFERING WITH BEAMS, COLUMNS OR ANY MEMBER IT IS TO BE TRIMMED SUITABLY AT SITE .

6) ALL THE LEVELS INDICATING IN THIS DRAWING REPERSENTS TOP OF STEEL UNLESS OTHERWISE MENTIONED.

DRAWING NUMBER ITEM NUMBER	DESCRIPTION	STD	DRAWING NUMBER	ITEM NO / VAR NO	MATERIAL CODE / MATERIAL SPECN	AUOM	UNIT WEIGHT / QUANTITY	CC ZONE
3	P-106 PLT12*89		3-36-392-31507			No	3.827 24	
2	P-105 PLT12*89		3-36-392-31506			No	3.827 8	
1	BP-101 PLT12*200		3-36-392-31505			No	9.803 16	

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TYPE OF PRODUCT
OR NAME OF
CUSTOMER/PROJECT

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

	NAME	SIGNATURE	DATE
DRN	ARAVINTHAN		28.01.2019
CHD	S.YUVARAJ		29.01.2019
APPD	S.YUVARAJ		29.01.2019

DEPT ST | COST 122 | ALL DIMENSIONS ARE IN MM | PROJECTION | SCALE NTS | WEIGHT (Kg) 279.113 | REF TO ASSY / OLD DWG

TITLE: SUPPLEMENTAL STEEL FOR REA R ARCH FLOOR SUPPORT (2)

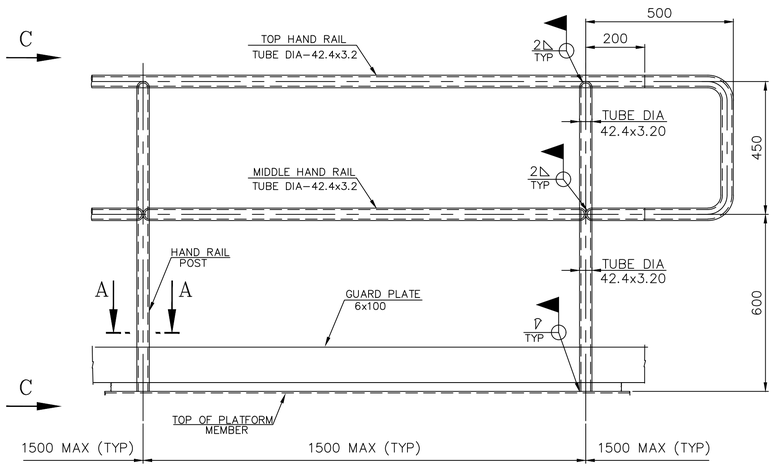
DRAWING NO : 0-36-392-25687

REV 0

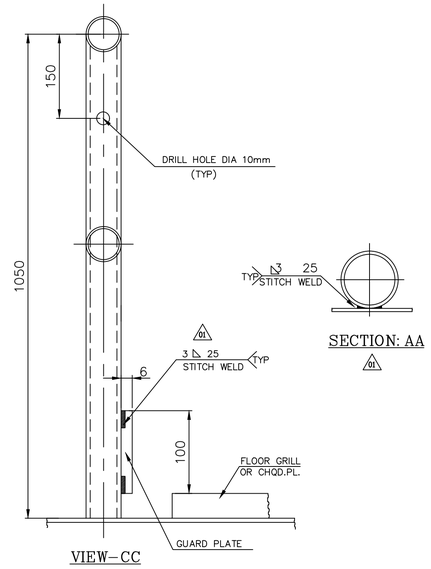
E-TENDER ENQUIRY NO.: PSER:PUR:BRH-S434:20 (ENQ:20:PP:0015:PUR:88) Date 05/03/2021.

DRAWING NO: 1-35-850-03806

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

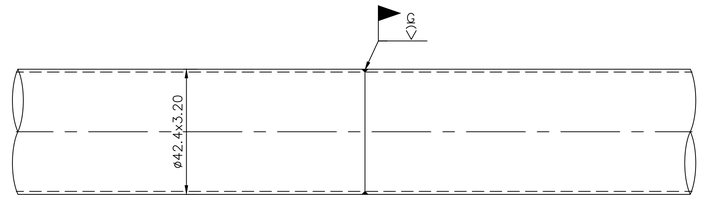


HANDRAILS&HANDRAIL POST FOR PLATFORM

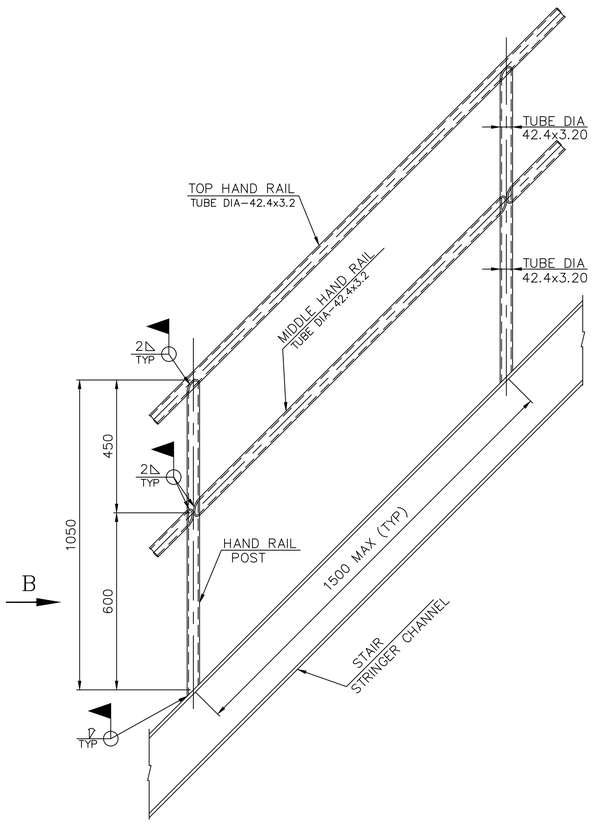


VIEW-CC

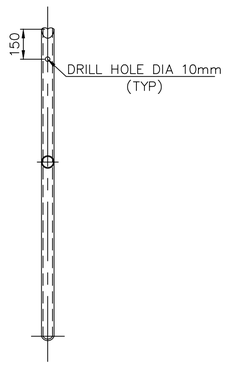
TYPE & SIZE OF WELD	TYPE OF ELECTRODE	LENGTH OF WELD IN 'M'
3	E7018	2.0
2	E7018	1.0
	E7018	1.0



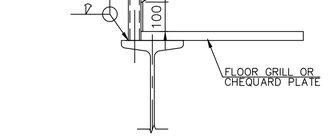
TYPICAL SITE JOINT FOR HAND RAIL



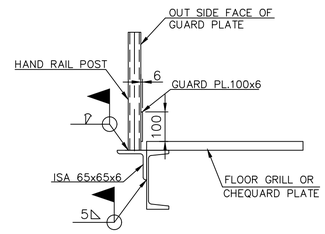
HANDRAILS&HANDRAIL POST FOR STAIRS



VIEW-B



FIXING OF HAND RAIL POST ON ISMB



FIXING OF HAND RAIL POST ON ISMC

NOTES: –

1. WELD REQUIREMENTS GIVEN PER POST ONLY.
2. ALL SHOP BURRS TO BE REMOVED AND SURFACES TO BE PREPARED FOR GALVANISING. MINIMUM WEIGHT OF GALVANISING SHALL BE 610gm/Sqm OR TO BE PAINTED AS PER APPROVED PAINTING SCHEME.
3. M.S. MATERIALS CONFORMING TO NB 32 MEDIUM CLASS IS:1161 YST240 ARE TO BE USED FOR HAND RAILS AND POSTS.

REV	DATE	ALTERED : S.SETHUPATHI
02	30-11-2016	CHD & APPD : P.SUBATHRADEVI
ZONE 02		PAINTING SCHEME NOTES ADDED.

REV	DATE	ALTERED : R.KARTHIK/A.NARESH
01	27-09-2013	CHD & APPD : D.V.N
ZONE B-7 C-7		WELD DETAIL ADDED FOR GUARD PLATE

VARIANT NUMBER	ITEM NUMBER	DESCRIPTION	STD	DRAWING NUMBER	ITEM NO	MATERIAL CODE	A/C/P	UNIT	UNIT WEIGHT	GS	ZONE
					VAR NO	MATERIAL SPECN		DI	QUANTITY		

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TYPE OF PRODUCT OR NAME OF CUSTOMER/PROJECT

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

	NAME	SIGNATURE	DATE
DRN	R.GNANAVEL		18.01.2006
CHD	H.A.JAFFAR		18.01.2006
APPD	R.JEYAKUMAR		18.01.2006

355-053

DEPT ST | ALL DIMENSIONS ARE IN MM | PROJECTION | SCALE N.T.S | WEIGHT (Kg)
CODE 122
REF TO ASSY / OLD DWG

TITLE: FIXING ARRANGEMENT OF HAND RAILS, HAND RAIL POST AND GUARD PLATE

DRAWING NO : 1-35-850-03806 REV 02

E-TENDER ENQUIRY NO.: PSER:PUR:BRH-S434:20 (ENQ:20:PP:0015:PUR:88) Date 05/03/2021.

CORPORATE DRG ID:TP-DG-1-36-820-31332/00

DRAWING NO. 1-36-820-31332

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

WELD TABLE

SIZE & TYPE OF WELD	TYPE OF ELECTRODE	TOTAL LENGTH OF WELD IN " M"
4 ◺	E7018	5
4 ◺⚐	E7018	5
5 ◺	E7018	5
5 ◺⚐	E7018	5
8 ◺	E7018	3
▽	E7018	3

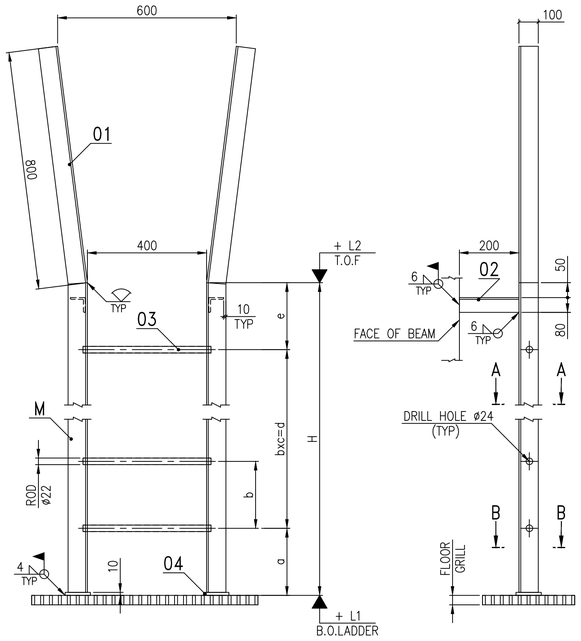
LEGEND :-

T.O.F – TOP OF FLOOR.
F.F.L – FINISHED FLOOR LEVEL.
B.O.L – BOTTOM OF LADDER.

NOTES:-

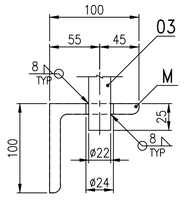
01. MATERIALS, WELDS AND OTHER REQUIREMENTS ARE GIVEN PER BOILER ONLY
02. MANUFACTURING REQUIREMENTS SHALL BE DONE AS PER RELEVANT Q.C.P.
03. FOR PRODUCTION NOTES REFER DRG. No. 3-35-110-00995/LATEST REVISION.
04. ALL SHOP BURRS TO BE REMOVED AND SURFACES TO BE CLEANED BEFORE GALVANISING OF FINISHED PRODUCTS.
05. ALL THE ITEMS ARE TO BE GALVANISED BY THE HOT DIP PROCESS WITH MINIMUM ZINC COATING OF 610gram/Sq.m.

FOR TENDER PURPOSE ONLY

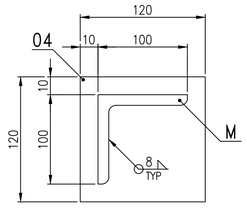


VERTICAL LADDER FROM PLATFORM TO PLATFORM

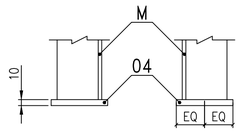
Level +L2 in MM	Level +L1 in MM	H	a	b	c	d	e	No of ladders	No of step rods	L	Item No: M
40100	38500	1600	270	265	4	1060	270	2	10	1590	05
55500	53600	1900	275	270	5	1350	275	4	24	1890	06
72200	71100	1100	220	220	3	660	220	2	8	1090	07



SECTION-A A



SECTION-B B



VARIANT NUMBER	ITEM NUMBER	DESCRIPTION	STD	DRAWING NUMBER	ITEM NO / VAR NO	MATERIAL CODE / MATERIAL SPECN	A/C/P	UNIT / DI	UNIT WEIGHT / QUANTITY	GS	ZONE
	07	ISA 100X100X10 1090				15013018 / IS2062Fe410A		No /	16.241 / 4		
	06	ISA 100X100X10 1890				15013018 / IS2062Fe410A		No /	28.161 / 8		
	05	ISA 100X100X10 1590				15013018 / IS2062Fe410A		No /	23.691 / 4		
	04	PLATE 10 120X120				15211098 / IS2062Fe410A		No /	1.130 / 16		
	03	ROD DIA-22 450				15339343 / SA-105		No /	1.341 / 42		
	02	ISA 80X80X8 200				15013058 / IS2062Fe410A		No /	1.920 / 16		
	01	ISA 100X100X10 800				15013018 / IS2062Fe410A		No /	11.920 / 16		

REV	DATE	ALTERED :
01		CHD & APPD :
ZONE		

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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	PRIYA/PRAKASH		09.11.2018
CHD	V.MENAGA		10.11.2018
APPD	S.YUVARAJ		12.11.2018

DEPT: ST | CODE: 120 | ALL DIMENSIONS ARE IN MM | PROJECTION | SCALE: N.T.S | WEIGHT (Kg) | REF TO ASSY / OLD DWG

TITLE: VERTICAL LADDER

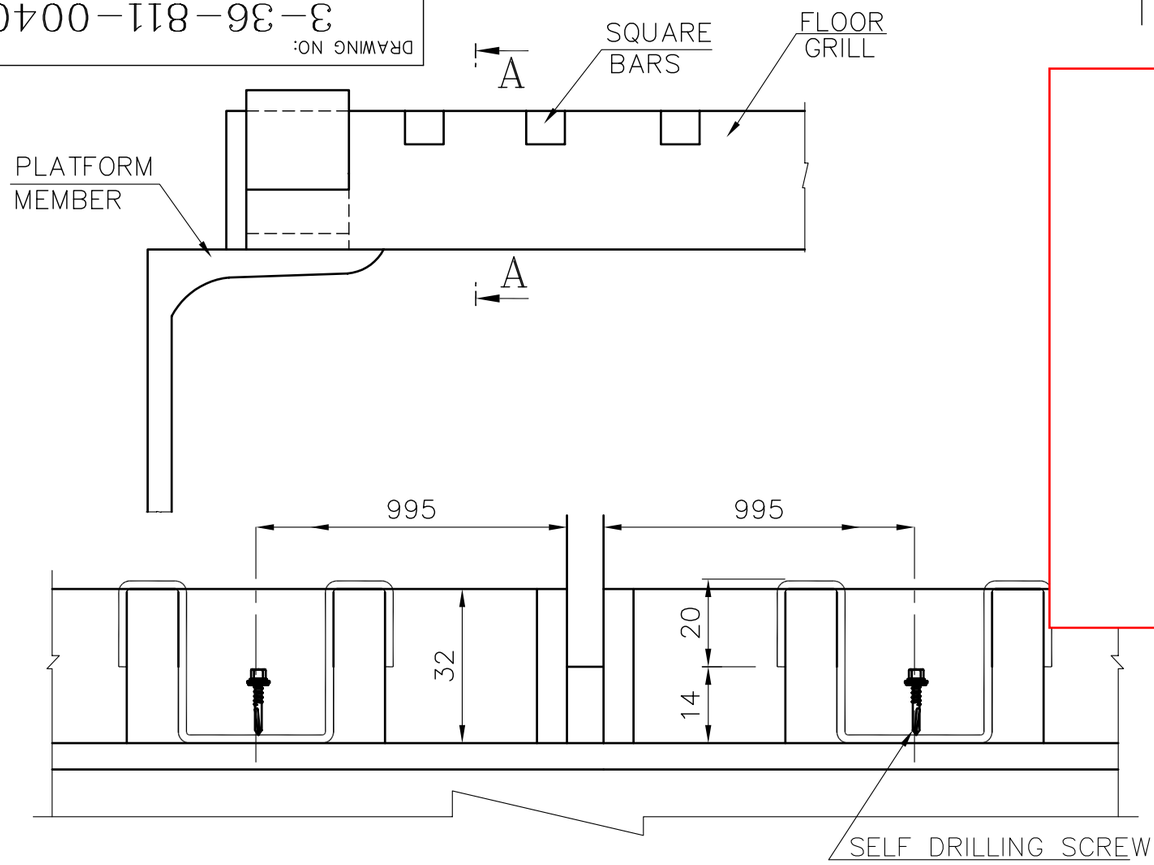
DRAWING NO : 1-36-820-31332 | REV: 00

E-TENDER ENQUIRY NO.: PSER:PUR:BRH-S434:20 (ENQ:20:PP:0015:PUR:88) Date 05/03/2021.

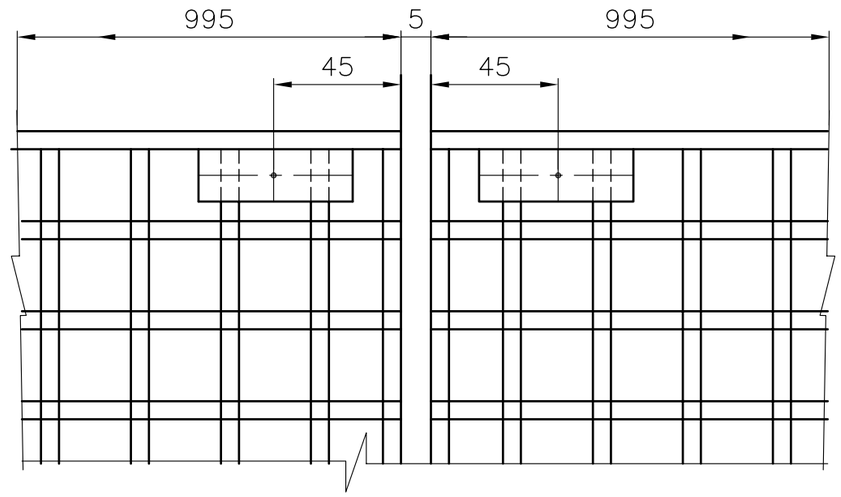
DRAWING NO: 3-36-811-00401

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

FOR TENDER PURPOSE ONLY



SECTION–AA

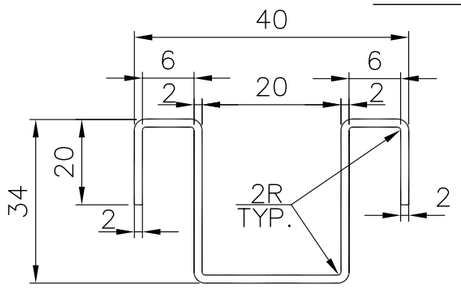


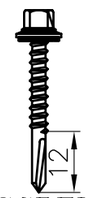
LOCATION OF CLIP

4 Nos OF CLIPS TO BE PROVIDED FOR FIXING EACH GRILL.

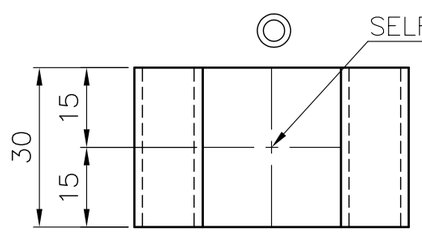
NOTES: –

1. ALL SHOP BURS TO BE REMOVED.SURFACES TO BE CLEAND / SAND BLASTERED/PICKED.
2. CLIPS ARE TO BE CADMIUM PLATED TO AN AVERAGE THICKNESS OF 18 MICRONS MINIMUM AS PER SERVICE CONDITION NO–3 OF IS 1572 LATEST.
3. THE SELF DRILLING SCREWS ARE TO BE PROCURED BY THE SITE AND COST DEBITED TO BHEL /TRICHY.





TYPICAL SCREW DETAIL



CLIP

REV	DATE	ALTERED :		REV	DATE	ALTERED :
02	07.12.06	CHD & APPD:	P.PARIMALA RRS	01	24/07/04	A.P.S CHD & APPD: R.J.PETER
ZONE	DRG.,UPDATED.			ZONE	NOTE–4, REMOVED	

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TYPE OF PRODUCT OR NAME OF CUSTOMER/PROJECT

Bharat Heavy Electricals Ltd
UNIT: HIGH PRESSURE BOILER PLANT
TIRUCHIRAPALLI – 620014
355–055

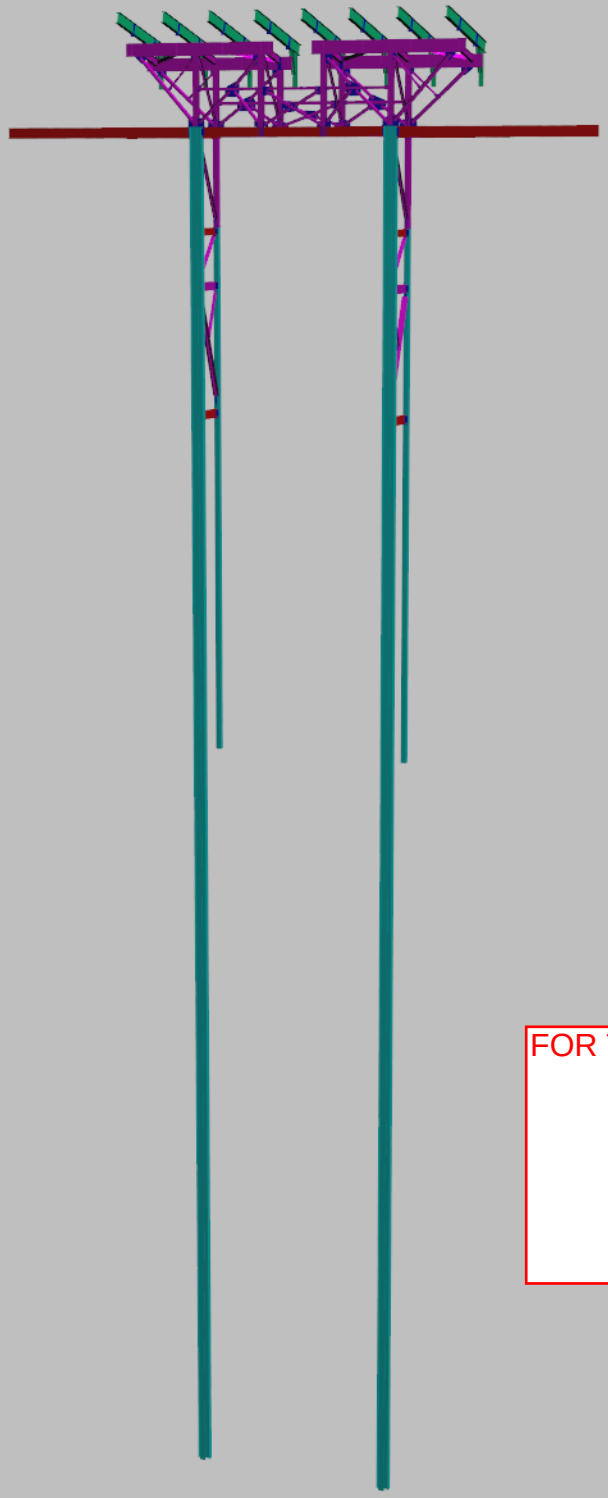
	NAME	SIGNATURE	DATE
DRN	V.VANAJA/JR		10.10.03
CHD	P.RAVINDRAN		
APPD	R.J.KUMAR		

DEPT	ALL DIMENSIONS ARE IN MM	PROJECTION	SCALE	WEIGHT (Kg)	REF TO ASSY / OLD DWG
ST			N.T.S		
CODE 122					

TITLE

FIXING ARRANGEMENT OF FLOOR GRILL–32MM TK.

DRAWING NO : 3–36–811–00401 REV 02



FOR TENDER PURPOSE ONLY

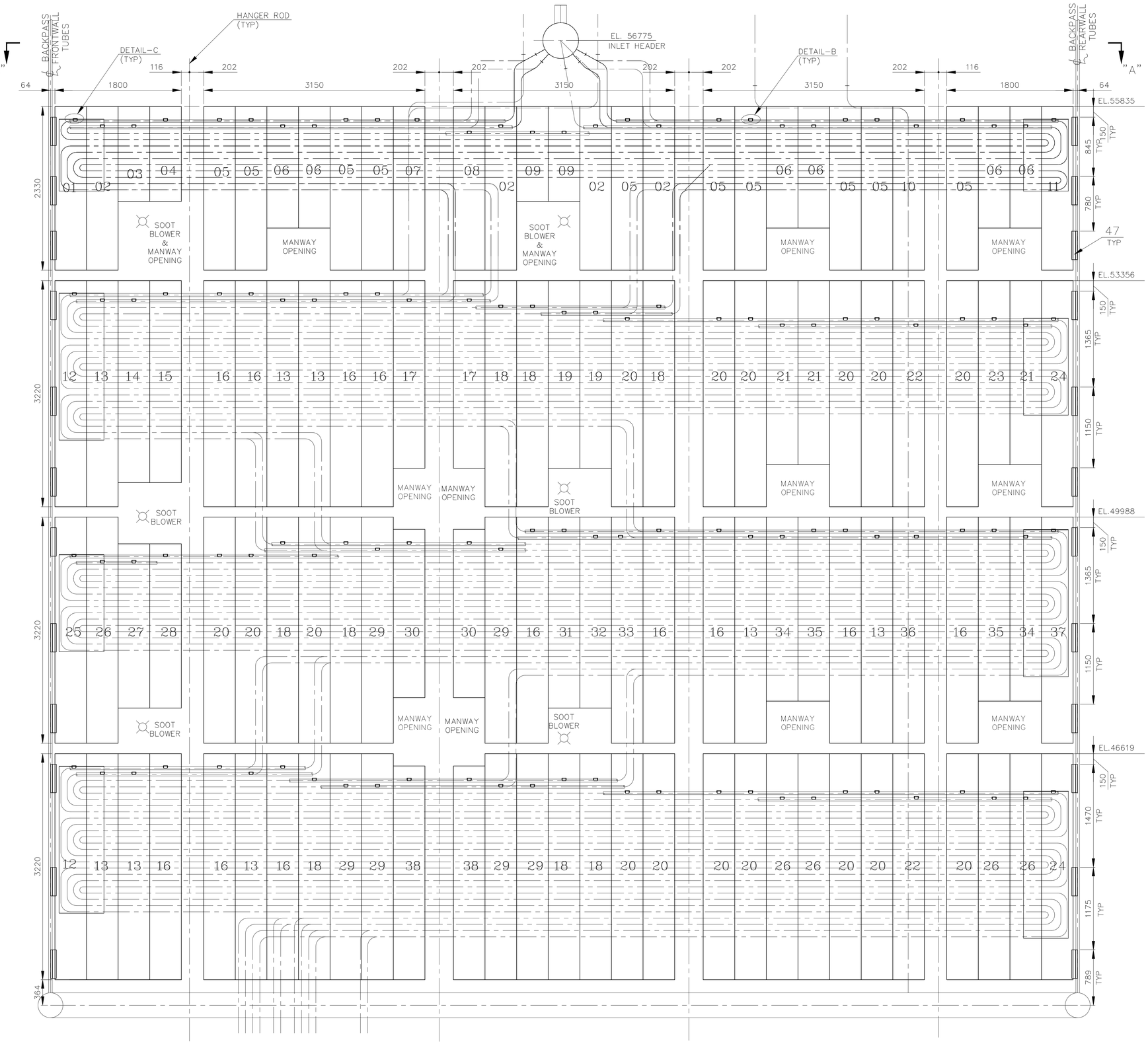
E-TENDER ENQUIRY NO.: PSER:PUR:BRH-S434:20 (ENQ:20:PP:0015:PUR:88) Date 05/03/2021.

CORPORATE DRG ID:TP-DG-0-00-214-24263/00

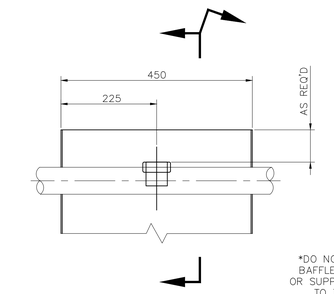
DRAWING NO 0-00-214-24263

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

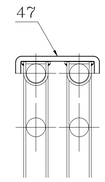
FOR TENDER PURPOSE ONLY



ECONOMIZER ANTI-VIBRATION BAFFLE ELEVATION
SCALE : 1:25



DETAIL-"B"
SUPPORT PLATE ERECTION
SCALE: 1:10



DETAIL-"C"
SUPPORT PLATE @ CASSETTE BAFFLE

NOTES:

1. MATERIAL IS RELEASED UNDER PGMA 30-224.
2. SITE SHOULD NOT WELD ANTI-VIBRATION BAFFLES OR SUPPORT BARS TO TUBES.
3. SITE TO CUT OUT BAFFLE PANELS TO CLEAR TUBE TIES, STOPS, SPACER BARS, ECON. HOPPER STIFFENERS ETC., WHERE EVER NECESSARY.
4. DU-050 IS PROVIDED AS ADDITIONAL ERECTION MATERIAL. IT CAN BE USED WHEREVER REQUIRED AS PER SITE CONDITIONS.
5. SITE TO SPREAD BAFFLE PANELS TO ENSURE SNUG FIT TO TUBES BEFORE WELDING. WELD ALL PANEL JOINTS WHERE EVER POSSIBLE.
6. SITE TO ENSURE THAT SOOT BLOWERS, WHEN FULLY EXTENDED IN COLD POSITION CLEAR SOOT BLOWER OPENING BY 12 - 25 mm IN THE FIRST BAFFLE ROW AND CLEAR BY 50-100 mm IN THE SECOND BAFFLE ROW FROM SIDE WALLS. FIELD TO CUT APPROPRIATE HOLE IN BAFFLE PLATES AS REQUIRED.
7. READ THIS DRAWING WITH 0-00-214-24264

CUSTOMER Nos.: 1700-1701

CUSTOMER: NTPC LIMITED

PROJECT: BARH SUPER THERMAL POWER PROJECT
STAGE-II (2x660MW) - UNIT NO 3&4
STEAM GENERATOR PACKAGE

BHARAT HEAVY ELECTRICALS LIMITED.,
BOILER PLANT UNIT; TIRUCHIRAPALLI-620014

	NAME		DATE
DRN	VINODH		10.05.19
CHD	N.M.K		11.05.19
APPD	N.S		11.05.19

TITLE: ANTI VIBRATION BAFFLES
SHEET 01 OF 02

ALL DIMENSIONS IN MILLIMETRE
PROJECTION
SCALE N.T.S

DRG.NO. 0-00-214-24263 REV. 00

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CORPORATE DRG ID:TP-DG-0-00-214-24263/00

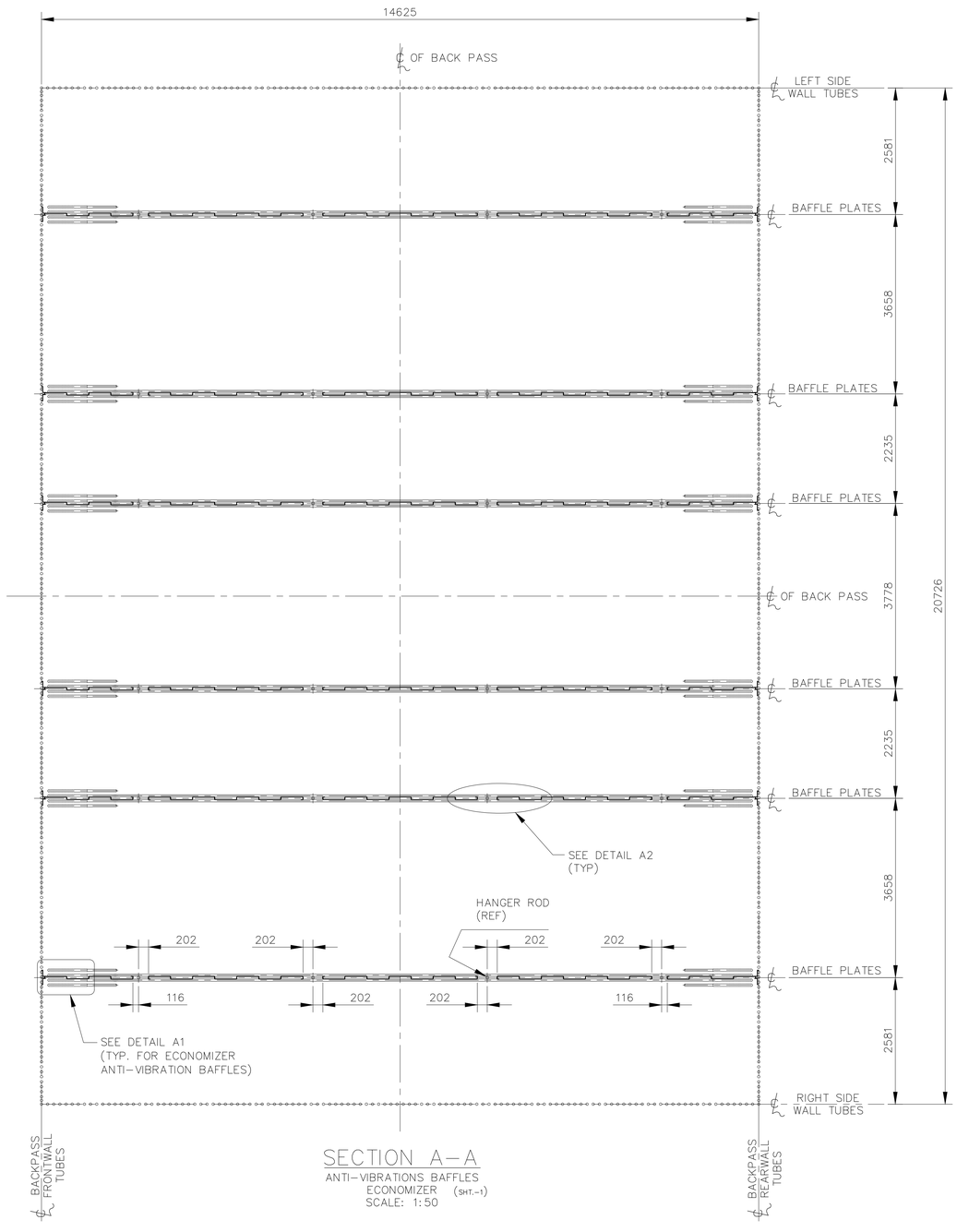
E-TENDER ENQUIRY NO.: PSER:PUR:BRH-S434:20 (ENQ:20:PP:0015:PUR:88) Date 05/03/2021.

CORPORATE DRG ID:TP-DG-0-00-214-24264/00

DRAWING NO. 0-00-214-24264

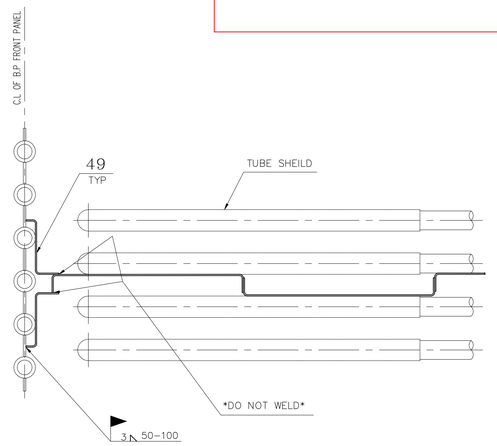
FOR TOLERANCES OF UNTOLERANCED DIMENSIONS DURING MANUFACTURE REFER PLANT STD. NO TP 023 0299

FOR TENDER PURPOSE ONLY



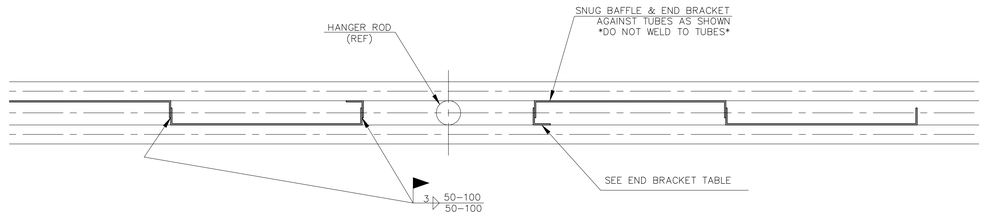
SECTION A–A

ANTI–VIBRATIONS BAFFLES
ECONOMIZER (SHT.–1)
SCALE: 1:50



DETAIL– A1

END BRACKET'S TABLE		
Sl No.	BAFFLE SHEET DU NO.	ASSOCIATED END BRACKET'S DU NO.
01	04	39
02	02,05,07,08&10	40
03	28	41
04	30	42
05	17	43
06	15	44
07	38	45
08	16,18,20,22&36	46



DETAIL– A2

ANTI–VIBRATIONS BAFFLES

NOTES:

01. READ THIS DRAWING WITH 0–00–230–24263

CUSTOMER Nos.: 1700–1701

CUSTOMER: NTPC LIMITED

PROJECT: BARH SUPER THERMAL POWER PROJECT
STAGE–II (2x660MW) – UNIT NO 3&4
STEAM GENERATOR PACKAGE

BHARAT HEAVY ELECTRICALS LIMITED.,
BOILER PLANT UNIT; TIRUCHIRAPALLI–620014

DRN.	VINODH	10.05.19	TITLE: ANTI VIBRATION BAFFLES
CHD.	N.M.K	11.05.19	
APPD.	N.S	11.05.19	SHEET 02 OF 02

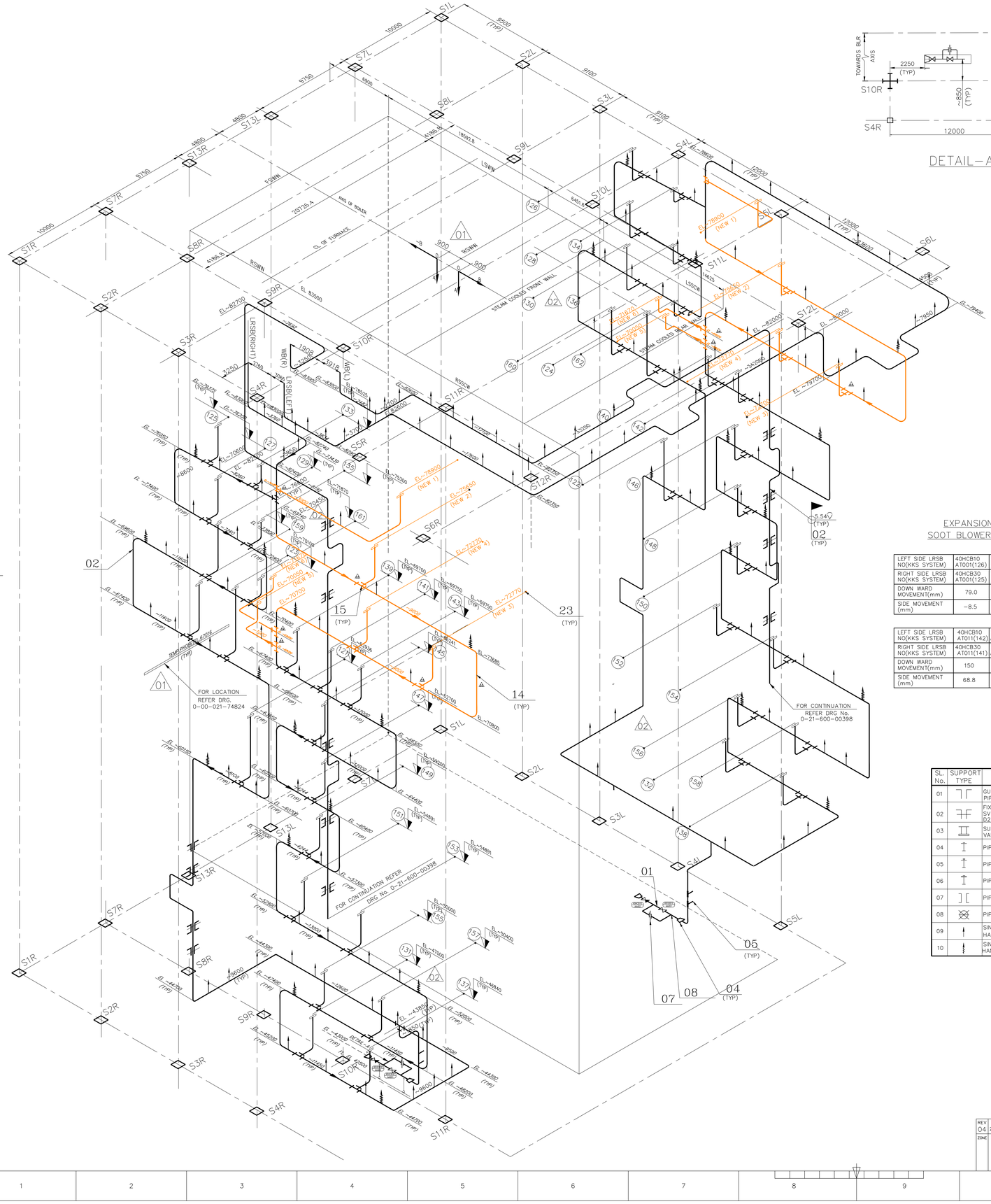
ALL DIMENSIONS IN MILLIMETRE | PROJECTION | SCALE N.T.S | DRG.NO. 0–00–214–24264 | REV. 00

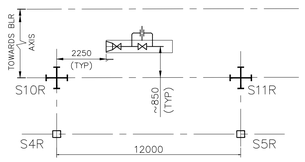
REV. | DATE | ALTD. CHD&APPD | DRN

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DRAWING NO. 0-21-600-00397

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





DETAIL–A

FOR TENDER PURPOSE ONLY

NOTES:

01. FOR GENERAL ERECTION NOTES REF DRG. No.: 2–21–600–00080.
02. FOR WELDING DETAILS REFER ERECTION WELDING SCHEDULE.
03. REFER DRG. No.: 3–21–600–00029 FOR REAR END SUPPORT OF LRSB.ACCORDING TO SITE CONDITIONS,DECIDE TO SUPPORT FROM BOTTOM FLOOR.USE ITEM NOS.10,11,12,13,19,20,21 & 22.
04. TEMPERATURE PROBE SUPPORT REFER DRG No.:1–21–601–00056 (USING SEAL PLATE DU No.024 OF PGMA 21–601)
05. ROUTING SHOWN IN THIS DRAWING ARE SUGGESTIVE,MINOR CHANGES CAN BE MADE TO SUIT ACTUAL SITE CONDITIONS.
06. DURING PIPE ROUTING IT MAY BE ENSURED THAT PROPER HEAD ROOM IS AVAILABLE AT ALL FLOORS.
07. FOR HYDRAULIC TESTING OF SOOT BLOWER PIPING,USE BLANK FLANGES AND PACKINGS OF ITEM Nos.05,09,16 & 17 IS TO BE USED.
08. FOR SUPPORT DETAILS REFER CHART–E.
09. THE SINGLE TIE ROD HANGER SUPPORT SHOWN FOR LRSB LINES SHOWN WITH SYMBOL ┿ TO BE SUPPORTED FROM THE SUPPORTING STRUCTURE EXIST NEARBY.
10. SPRING CAGE ASSY.ARE TO BE LOCKED DURING HYDRAULIC TEST AT SITE.
11. INSTRUMENT IMPULSE PIPE D21.3 x 3.73 IS SUPPLIED UNDER PGMA 21–600 DU.NO.041.(ITEM No.01).
12. FOR REVISED SEQUENCE NUMBER OF LRSB'S AFTER LRSB ADDITION PLEASE REFER THE P&ID OF SOOT BLOWER SYSTEM 1 AND 2.

REFERENCE DRAWINGS: –

01.SCHEME OF SOOT BLOWING SYSTEM WITH VALVES,FITTINGS & INSTRUMENTATION REFER DRG.No.0–00–047–47888 & 0–00–047–47889

02.LOCATION OF FURNACE OPENINGS AND BUCKSTAYS REFER DRG.No.0–00–020–74734.

△04

LEFT SIDE LRSB NO(KKS SYSTEM)	40HCB10 AT022 NEW5	40HCB10 AT025 NEW4	40HCB10 AT026 NEW3	40HCB10 AT024 NEW2	40HCB10 AT023 NEW1	40HCB10 AT027 NEW6	
RIGHT SIDE LRSB NO(KKS SYSTEM)	40HCB30 AT022 NEW5	40HCB30 AT025 NEW4	40HCB30 AT026 NEW3	40HCB30 AT024 NEW2	40HCB30 AT023 NEW1	40HCB30 AT027 NEW6	
DOWN WARD MOVEMENT(mm)	178.3	134.07	134.07	114.96	92.81	151.95	
SIDE MOVEMENT (mm)	22.86	35.07	98.95	35.07	35.07	2.52	

△03

EXPANSION MOVEMENT DETAILS AT SOOT BLOWER LOCATIONS & TEMP.PROBE

△01 △02

LEFT SIDE LRSB NO(KKS SYSTEM)	40HCB10 AT001(126)	40HCB10 AT002(134)	40HCB10 AT003(136)	40HCB10 AT004(128)	40HCB10 AT005(130)	40HCB10 AT020(162)	40HCB10 AT021(160)	40HCB10 AT008(124)	40HCB10 AT009(122)	40HCB10 AT010(144)	TEMP.PROBE LEFT SIDE& RIGHT SIDE
RIGHT SIDE LRSB NO(KKS SYSTEM)	40HCB30 AT001(125)	40HCB30 AT002(133)	40HCB30 AT003(135)	40HCB30 AT004(127)	40HCB30 AT005(129)	40HCB30 AT020(161)	40HCB30 AT021(159)	40HCB30 AT008(123)	40HCB30 AT009(121)	40HCB30 AT010(143)	
DOWN WARD MOVEMENT(mm)	79.0	83.7	101.8	96.8	112.3	295	294	131.0	193.2	150	167.3
SIDE MOVEMENT (mm)	−8.5	−3.2	−3.2	−8.5	−8.5	75.5	29.0	−5.1	−5.1	48.1	−5.1

LEFT SIDE LRSB NO(KKS SYSTEM)	40HCB10 AT011(142)	40HCB10 AT012(140)	40HCB10 AT013(146)	40HCB10 AT014(148)	40HCB10 AT015(150)	40HCB10 AT016(154)	40HCB10 AT017(152)	40HCB10 AT019(156)	40HCB10 AT018(158)	40HCB10 AT006(138)	40HCB10 AT007(132)	
RIGHT SIDE LRSB NO(KKS SYSTEM)	40HCB30 AT011(141)	40HCB30 AT012(139)	40HCB30 AT013(145)	40HCB30 AT014(147)	40HCB30 AT015(149)	40HCB30 AT016(153)	40HCB30 AT017(151)	40HCB30 AT019(155)	40HCB30 AT018(157)	40HCB30 AT006(137)	40HCB30 AT007(131)	
DOWN WARD MOVEMENT(mm)	150	150.3	172.2	194.6	216.8	244.1	244.1	275	272.5	121.1	136.4	
SIDE MOVEMENT (mm)	68.8	22.4	29.0	29.0	29.0	68.5	28.7	29.0	68.8	−3.2	−5.1	

△02

SL. No.	SUPPORT TYPE	DESCRIPTION	No.OF ASSY.	DRAWING No.	ITEM No.	1	2	3	4	5	6	7
01		GUIDE FOR SV EXHAUST PIPE D273.0	1	3–21–601–00247	DU.Nos.	+002	+005					
02		FIXED SUPPORT FOR SV EXHAUST PIPE D273.0	1	3–21–601–00248	DU.Nos.	+005	+007	+007				
03		SUPPORT OF SAFETY VALVE	1	3–21–601–00204	DU.Nos.	+009	+006					
04		PIPE SADDLE –1"	12	3–21–601–00659	DU.Nos.	+006	+010	+011	+039	011 ●	004 ●	012 ●
05		PIPE SADDLE –2"	16	3–21–601–00658	DU.Nos.	+006	+010	+011	+038	010 ●	004 ●	
06		PIPE SADDLE D127	7	3–21–601–00655	DU.Nos.	+006	+010	+011	+035	010 ●	004 ●	012 ●
07		PIPE GUIDE –2"	32	3–21–601–00660	DU.Nos.	004 ●	010 ●	034 +				
08		PIPE ANCHOR–2"	20	3–21–601–00661	DU.Nos.	+025	004 ●	011 ●	+034			
09		SINGLE TIE ROD HANGER–2"	160	3–21–601–00260	DU.Nos.	+026	+027	008 ●				
10		SINGLE TIE ROD HANGER–2" WITH SCA	35	3–21–601–00583	DU.Nos.	+016	+026	+027	+028	008 ●	009 ●	

(+ ISSUED UNDER PGMA 21–601 AND ● ISSUED UNDER PGMA 21–700)

CHART–E

ISSUED UNDER PGMA : 21–601 NS5

ISSUED UNDER PGMA : 21–600 NS4

ISSUED UNDER PGMA :21–601

ISSUED UNDER PGMA :21–600

△04

SU NUMBER	ITEM NUMBER	DESCRIPTION	QTY	DRAWING NUMBER		MATERIAL CODE	R/A	UNIT WEIGHT	SU
					ITEM NO		CHART		
					VAR NO	MATERIAL SPECN	DI	QUANTITY	ZONE
009	26	SUSPENSION PLATE					A	NO L	
026						IS2062E250GRA			24
008	25	PIPE CLAMP ROD TYPE					A	NO L	
025						IS2062FE410GRA			24
007	24	VLH TYPE SH–07–16						NO L	4
006	23	MOUNTING ARRGT. OF LRSB					A	NO L	
023						IS1079D			12
005	22	ISA 50 X 50 X 6					A	M L	
022						IS2062E250GRA			50
004	21	ISMC 150					A	M L	
021						IS2062E250GRA			85
003	20	PLATE 16X100X2000					A	NO L	
020						IS2062E250GRA			2
002	19	PLATE 6X1000X1000					A	NO L	
019						IS2062E250GRA			1
001	18	ROUND D10					A	M L	
018						IS2062FE410GRA			50
004	17	SPIRAL WOUND GASKET					N–	NO L	
020									12
003	16	BLIND FLG 2.5" CL300					A	NO L	
019						SA105			12
002	15	SW EQ TEE 1"CL6000						NO L	
018						SA182F22CL3			12
001	14	PIPE D60.3 x 5.54 L = 170m					A	NO L	
017						SA335P22			1
008	13	ISA 50 x 50 x 6					MR L		
						IS2062Fe410A			35
005	12	ISMC 150					MR L		
						IS2062Fe410A			150
003	11	PL.16 x 100 x 2000					NO L		1
						IS2062Fe410A			1
002	10	PLATE 6 X 50 X 2000					NO L		
						IS2062Fe410A			38
027	09	CAF JOINTG		6114–2094			NO L		
						CAF JOINT A/S			42
047	08	SW EQ TEE 1"CL6000					NO L		
						SA182F22CL3			4
036	07	ORFICE PLATE AS ARRGT.–1"(AS)		3–21–600–00650			M A		
						WELDMENT		L	2
035	06	ASSEMBLY FOR THERMOCOUPLE–AS		3–21–600–00653			M A		
						WELDMENT		L	4
018	05	BLIND FLG 2.5" CL300					NO A		
						SA105		L	42
017	04	BW RED 2x1" SCH160					NO A		
						SA234WP22CL1		L	4
011	03	SW EQ TEE 2"CL6000					NO A		
						SA182F22CL3		L	50
003	02	PIPE D60.3 x 5.54 L = 700m					NO A		
						SA335P22		L	1
002	01	PIPE D33.4 x 4.55 L = 50m					NO A		
						SA335P22		L	1

REV	DATE	ALTERED : SAJI P J	REV	DATE	ALTERED : P.DEEPAK	REV	DATE	ALTERED : P.DEEPAK	REV	DATE	ALTERED : P.DEEPAK
04	25.07.19	CHD & APPD : V.G.S	03	23.10.18	CHD & APPD : V.G.S	02	01.06.13	CHD & APPD : I.GOPALAN	01	05.03.13	CHD & APPD : I.GOPALAN
ZONE	02 NO LRSB'S ADDED △4		ZONE	10 NO OF LRSB ADDED. △3		ZONE	LRSB TAG. Nos CORRECTED AS INDICATED BY △2		ZONE	EXPANSION MOVEMENT DETAIL FOR SB FURNACE TEMP. PROBE ADDED.	

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TYPE OF PRODUCT OR NAME OF CUSTOMER/PROJECT: BARH–II– 2x660MW(UNIT–4&5) CUST. Nos.; 1700 & 1701

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

	NAME	SIGNATURE	DATE
DRN	ASHUTOSH		08/09/12
CHD	P.DEEPAK		08/09/12
APPD	I.GOPALAN		08/09/12

355–052 | DEPT: BM | CODE: 121 | ALL DIMENSIONS ARE IN MM. | PROJECTION | SCALE: N.T.S. | WEIGHT (Kg): – | REF TO ASSY / OLD DWG

TITLE: SOOT BLOWER PIPING & SUPPORTS (LRSB)

DRAWING NO : 0–21–600–00397 | REV 04

TP-DG-2-21-600-00080
CORPORATE DRG ID

E-TENDER ENQUIRY NO.: PSER:PUR:BRH:S434:20 (ENQ:20:PP:0015:PUR:86) Date 05/03/2021.

FIRST ANGLE PROJECTION (ALL DIMENSIONS IN MILLIMETRES)

05-228/C

DRAWING NO. 2-21-600-00080

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1. ROUTINGS OF PIPES SHOWN IN THE DRAWING ARE DESIGN RECOMMENDATIONS.
2. MODIFICATION IS TO BE CARRIED OUT SUITABLY AT SITE CONSIDERING THE FOLLOWING POINTS.
   - A. ADEQUATE SLOPS FOR DRAINS. (3°TO 5° INCLIN ATION)
   - B. ADEQUATE HEADROOMS WHEREVER THE TUBES ARE CROSSING WALKWAYS AND PLATFORMS.
   - C. EASY ACCESSCIBILITY FOR OPERATION AND MAINTENANCE OF VALVES AND OTHER FITTINGS.
   - D. ENOUGH CLEARENCE BETWEEN PIPE AND STRUCTURAL MEMBERS.
   - E. ADEQUATE FLEXIBILITY TO ABSORB DIFFERENTIAL, EXPANSION.
   - F. FEASIBILITY FOR SUPPORTING FROM NEAREST STRUCTURE.
   - G. CLEARANCE TO APPROACH DOORS AND OTHER APERTURES.
3. TUBE ENDS ARE TO BE EDGE PREPARED FOR WELDING WHEREVER NECESSARY.
4. OPENING ON OUTER SHEET CASING SHOULD BE PROPERLY COVERED WITH MATERIALS SUPPLIED IN PG.37 WITH PROVISIONS FOR THE MOVEMENT OF THE BOILER.
5. ANGLES AND CHANNELS ARE TO BE CUT AND DRILLED TO THE REQUIREMENT AT SITE.
6. ELEVATION OF SOOT BLOWERS SHOWN IN THE DRAWING IS AT WALL BOX CENTRE LINE DURING COLD CONDITION.
7. ALL NECESSARY HOLES TO BE CUT IN THE GRILLS TO ALLOW PIPING
8. ALL LINES ARE TO BE BLOWN OUT CLEARLY BEFORE ERECTION OF SOOT BLOWER PIPING.
9. USE BLANK FLANGES FOR CLOSING THE PIPE FOR HYDRAULIC TEST
10. LRSB SHOULD BE SUPPORTED SO THAT THE OUTBOARD END IS LIFTED ABOVE THE CENTRE LINE OF THE WALL BOX DURING HOT CONDITION TO PERFORM CONDENSATE DRAINING AS PER DRGS RELEASED IN PGMA 00-076.
11. LRSB SHOULD NOT BE SUPPORTED MORE THAN TWO POINTS.
12. WELDING AS PER PROCESS SHEET.
13. HEAT TREATMENT AS PER SCHEDULE APPROVED BY C.I.B | TAMILNADU
14. FOR SOCKET WELDING REFER DRG. NO. 4-21-600-00173
15. EDGE PREPN AS PER BPS. TP 0620599
16. FOR SOOT BLOWER ERECTION DETAILS REFER C-C-00-076. SINCE ALL THE BLOWERS ARE NOT IDENTICAL THE BLOWERS ARE TO BE ERECTED ACC. TO THE BLOWERS NOS. INDICATED IN THIS DRG.
17. WHILE ERECTING SOOT BLOWER PIPING SITE SHOULD LEAVE SUFFICIENT CLEARENCE BETWEEN THE STRUCTURAL MEMBERS AND PIPING INCLUDING INSULATION CONSIDERING WATERWALL DOWNWARD AND SIDE EXPANSION THIS IS TO ENSURE THAT THERE IS NO RESTRAINTS WITH PIPING AS WELL AS WITH WATERWALLS.
18. AFTER ERECTION, OPERATE THE BLOWER MANUVALLY TO CHECK FOR ANY INTERFERENCE.
19. WALL BLOWER INLET PIPE SUSPENSION HANGERS WHICH SHOULD BE LOCATED NEAR THE WALL BLOWER SHALL BE WELDED WITH BOILER STEEL (BUCKSTAY, FURNACE GUIDE ETC) ONLY TO AVOID THERMAL STRESS OTHER SUSPENSION HANGERS FOR THE SAME PIPE CAN BE WELDED WITH PLATFORM STRUCTURE. OR LOCATION SHOWN IN THE ERECTION DRAWING
20. PLATFORM BEAM BUCKSTAYS & COLUMNS SHOULD NOT BE CUT DURING ERECTION FOR THE PURPOSE OF SOOT BLOWER PIPING ERECTION. ELLS, BENDS & TUBES CAN BE USED TO AVOID ANY INTERFERANCE WITH PLATFORM BEAMS, BUCKSTAYS OR COLUMNS IF ANY CUTTING IS PLANNED BY SITE PRIOR PERMISSION SHOULD BE OBTAINED FROM CONCERNED DESIGNER.
21. NOS. ENCIRCLED ARE THE SERIAL NOS. OF BLOWERS FOR SEQUENTIAL OPERATION.
22. VALVE TAG. NOS. ARE INDICATED AS SB. ETC.,
23. BLOWING PR FOR EACH BLOWER ARE TO BE ADJUSTED AS PER THE RECOMONDED PRESSURES, INDICATED IN O & M INSTRUCTIONS
24. FOR SAFETY VALVE ESCAPE PIPE ARRANGEMENT REFER DRG. NO. 4740-0830/XX
25. BENDS SHALL BE FABRICATED AT SITE OUT OF PIPE MATLS ISSUED. BENDS ARE TO BE MADE AT SITE UP TO NB 50 WITH THICKNESS UP TO 8 & 8.3 MM FOR C.S & A.S REPLY. WITH SUITABLE HEAT TREATMENT PROCEDURES.

RADIOUS OF BEND:

1/2"	–	75
1"	–	120
2"	–	240

26. FOR GENERAL ERECTION AND GUIDELINES REFER SOOT BLOWERS MANUAL "METHODS AND PROCEDURES FOR INSTALLATION" - PUBLICATION NO 7508-78.
27. SB. PR. REDCING VALVE SHOULD NOT BE INSTALLED DURING INITIAL ERECTION. AFTER COMPLETION OF LINES AND ACID CLEANLINESS OF PIPING, CONTROL VALVE SHOULD BE INSTALLED. THIS IS TO AVOID ENTRAPMENT OF ELECTRODE OR OTHER METAL PIECES CAUSING DAMAGE TO SEAT DURING COMMISSIONING.

FOR TENDER PURPOSE ONLY

VARIANT NO.	ITEM NO.	DESCRIPTION	STD	DRAWING NO.	ITEM NO. / VAR NO.	MATL CODE / MATL SPEC	A/C	UNIT	UNIT WT / QTY	S	ZONE

TYPE OF PRODUCT OR NAME OF CUSTOMER/PROJECT

1151454

Bharat Heavy Electricals Ltd.,
BOILER PLANT UNIT
TIRUCHIRAPALLI-620 014

	NAME	SIGN	DATE	NO. OF VAR
DRN	K. RAJA			
CHD	R.M			
APPD	R.M.			

REV	DATE	ALTERED / CHECKED	ZONE
01	17.2.90	1) NOTE 1, 2C, 3, 10, 17A, 19 ARE CORRECTED. 2) NOTE. 27 ADDED.	

DEPT	GRADE OF UNTOL. DIM	SCALE	WEIGHT (kg)	REF TO ASSY / OLD DRG	ITEM NO.
PP	C/M/F	–	–	2-21-600-00076	
CODE 121					

TITLE: GENERAL ERECTION NOTES

CARD CODE: U 01

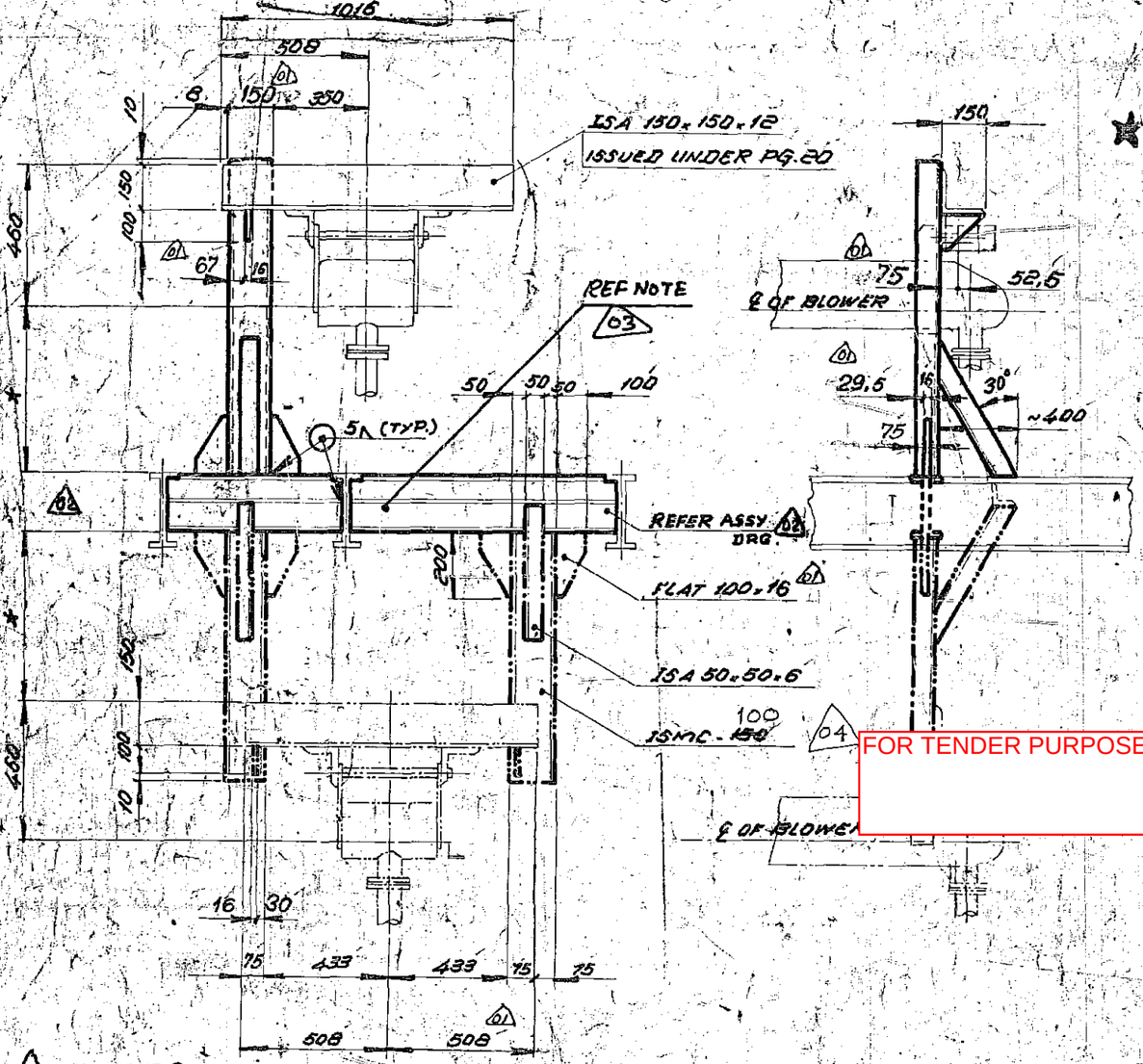
DRAWING NO.: 2-21-600-00080 REV: 01

Size A2

TP-DG-2-21-600-00080
CORPORATE DRG ID

TP-DG-3-21-600-00029
CORPORATE DRG ID

E-TENDER NO.:PPSER:PUR:BRH-S434:20 (ENQ:20:PP:0016:PUR:BRH:S434:20)



03 NOTES:

1. THIS SUPPORT CAN BE CANTILEVER SUPPORT, CANTI LEVER SPAN NOT TO EXCEED 600MM
2. IF SUPPLIED BEAM FOUND TO BE IN SUFFICIENT, ISMC 150 MAY BE USED

NOTE:

ALL THE MATERIALS ARE ISSUED IN MAIN ASSY.

★ FOR BLOWER ELEVATION W.R.T. PLATFORM REFER THE DRG. OF SOOT BLOWER PIPING AND SUPPORTS. METHOD OF SUPPORTING SHOULD BE DONE AS PER THE DRG. OF SOOT BLOWER PIPING AND SUPPORTS.

REV	DATE	ALTD: A. Shanmugam CHD & APPD: C.G. Sambandam	REF. DRG./BPS No.	ITEM	34 MATERIAL CODE	56	57	63 UNIT wt. (Kg.)	68	75	76	20
					32 STL 44 MATERIAL SPECN.	A C	COMP. GROUP	70 No. OFF		BMI	P	DESCRIPTION / REMARKS
04		VERTICAL SUPPORT SIZE ALTERED.										
03	DATE 18.3.82 ALTD: CHD: P. Shanmugam	NOTE ADDED										
02	DATE 17.12.77 ALTERED: CHECKED	ISMB 200 REMOVED AND NOTE ADDED										
01	DATE 19.10.76 ALTERED CHECKED	FLAT 100×10 CHANGED TO 100×16 AND DIMENSIONS ALTERED										

CARD TYPE 1 — CARD TYPE 2

BILL OF MATERIAL No.

00392 496

BHARAT HEAVY ELECTRICALS LTD
BOILER PLANT UNIT, TIRUCHIRAPALLI-620 014

FIRST ANGLE	SCALE	DRAWN	V. Lakshmikanth
		CHECKED	
		APPROVED	
ALL DIMENSIONS IN MILLIMETRES		DATE	30TH AUGUST, 1975.

TOTAL wt. (Kg.) | TYPE | NEW/OLD DRG. No.

TITLE: SUPPORT FOR LRSB

DRAWING No. 3-21-600-00029 04

CARD CODE U01

FOR TENDER PURPOSE ONLY

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05-229/A

TP-DG-3-21-600-00029
CORPORATE DRG ID

TP-DG-3-21-601-00260
CORPORATE DRG ID

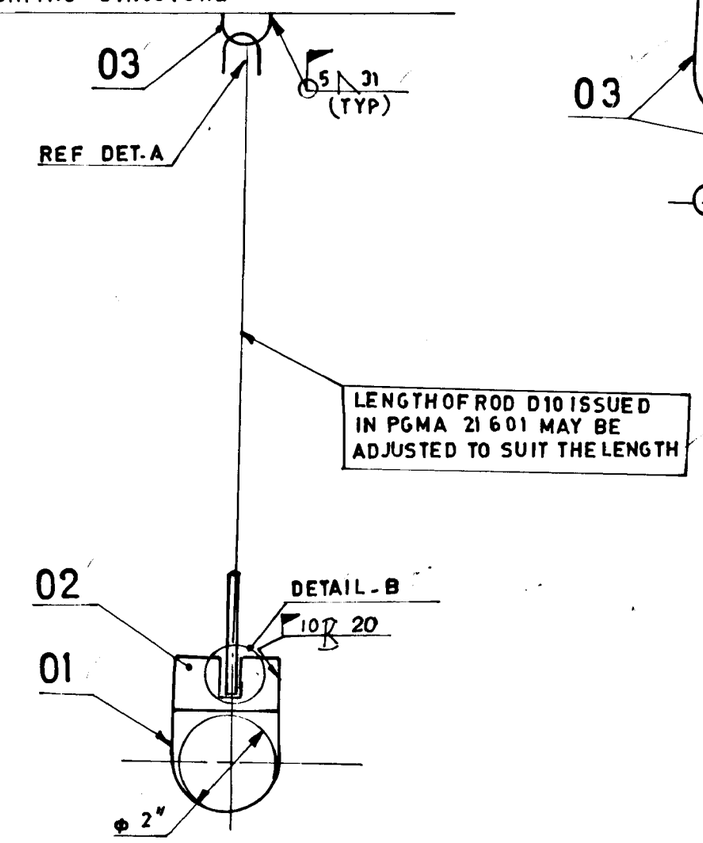
FIRST ANGLE PROJECTION (ALL DIMENSIONS ARE IN MILLIMETRES)

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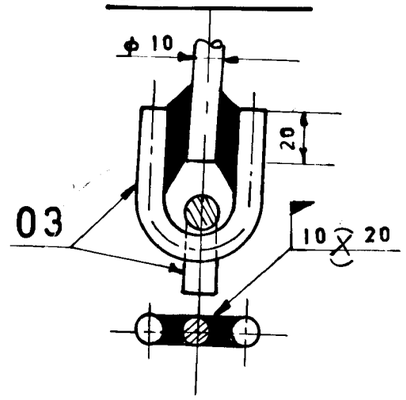
05-229/C

DRAWING NO. 3-21-601-00260

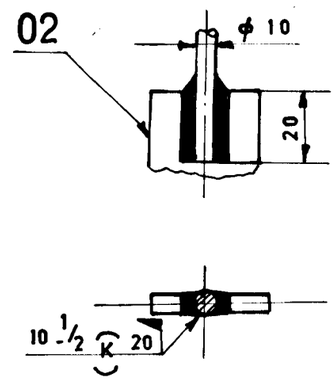
SUPPORTING STRUCTURE



DETAIL - A



DETAIL - B



TYPE OF WELD	ELECTRODE	WELD LENGTH IN M	REMARKS
10 X	E 7018	0.04	CERTIFY
10 1/2 K	E 7018	0.04	CERTIFY
5 Δ	E 7018	0.06	CERTIFY
10 K	E 7018	0.04M	CERTIFY

FOR TENDER PURPOSE ONLY

VARIANT NO.	ITEM NO.	DESCRIPTION	STD.	DRAWING NO.	ITEM NO / VAR NO.	MATL. CODE / MATL. SPEC.	A/C	UNIT / D1	UNIT WT. / QTY.	GS
	03	EYE HANGER NB 50-80	S	7740_18-3021		94_255_010			0.080 / 2	
01	02	SUSPENSION PLATE		~~4-21-000-00962~~ ~~4-21-601-00851~~		15_011_098 / IS 2062 Fe 410A			0.141 / 1	
	01	PIPE CLAMP (ROD TYPE)		4-21-601-00850		15_004_030 / IS 2062 Fe 410A			0.198 / 1	

NOTES :

ITEM NOS. 01, 02 ISSUED UNDER PGMA 21-601.

ITEM NO. 03 ISSUED UNDER PGMA 21-700.

REV	DATE	ALTERED & CHD & APPD
02	12/9/97	K.Sub.

MATERIAL SPECN.: ALTERED FOR IT. NO. 01 & 02

REV	DATE	ALTERED / CHECKED
01	15/7/93	K.Sub.

1. IN ITEM NO: 02. DRAWING NO REVISED.

TYPE OF PRODUCT OR NAME OF CUSTOMER/PROJECT

Bharat Heavy Electricals Ltd.,
BOILER PLANT UNIT
TIRUCHIRAPALLI — 620 014

	NAME	SIGN.	DATE
DRN.	B. SIVARAJ	B. Sivaraj	
CHD.	G.S.R	G.S.Rajasekhar	12/12/87
APPD.	G.S.R	G.S.Rajasekhar	12/12/87

NO. OF VAR.

DEPT.	GRADE OF UNTOL DIM.	SCALE	WEIGHT (kg.)	REF. TO ASSY./OLD DRG.	ITEM NO.
PP	C/M/F	N.T.S.	0.499		
CODE 121					

TITLE	CARD CODE	DRAWING NO.	REV.
SINGLE TIE ROD HANGER 2"	U 01	3_21-601-00260	02

Size A3

TP-DG-3-21-601-00260
CORPORATE DRG ID

TP-DG-3-21-601-00583
CORPORATE DRG ID

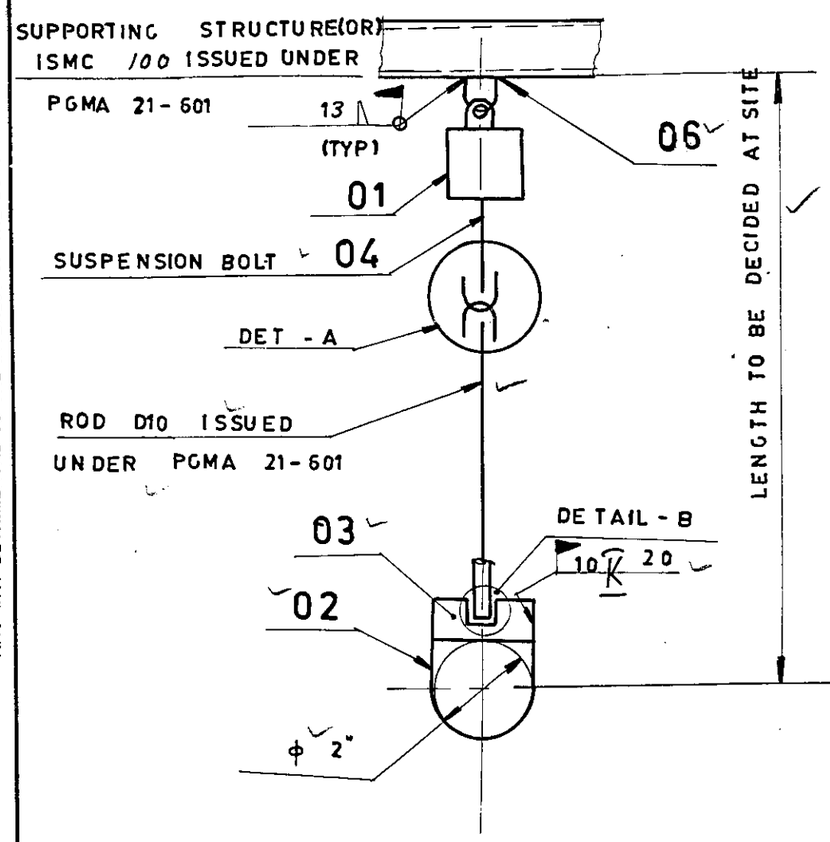
FIRST ANGLE PROJECTION (ALL DIMENSIONS ARE IN MILLIMETRES)

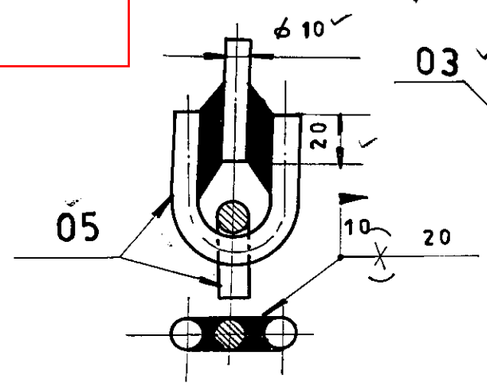
05-229/C

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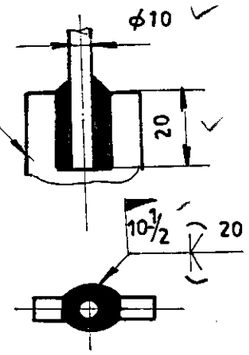
DRAWING NO. 3-21-601-00583

FOR TENDER PURPOSE ONLY





DETAIL - A



DETAIL - B

TYPE OF WELD	LENGTH OF WELD	TYPE OF ELECTRODE / WIRE	REMARKS
10 ½ K	0.04	E 7018	CERTIFY
10 X	0.12 M	E 7018	CERTIFY
13 △	0.138	E 7018	CERTIFY
10 K	0.04 M	E 7018	CERTIFY

VARIANT NO.	ITEM NO.	DESCRIPTION	STD.	DRAWING NO.	ITEM NO.	MATL. CODE	A C I	UNIT	UNIT WT.	GS
					VAR. NO.	MATL. SPEC.		DI	QTY.	
	06	EYE HANGER NB 200-250	S	7740-1830-24					1	
	05	EYE HANGER NB 50-80	S	7740-1830-21					2	
	04	SUSPN. BOLT		4-21-601-01108	06	SA 105			1	
	03	SUSPN PLATE		4-21-000-00962		IS 2062 Fe 410A			1	
	02	PIPE CLAMP ROD TYPE		4-21-601-00850		IS 2062 Fe 410A			1	
02	01	SPRING GAGE ASSY SH-7-160				ASSY			1	

NOTES:

01. ITEM NOS. 01 TO 04 ARE ISSUED UNDER PGMA 21-601

02. ITEM NOS. 05 & 06 ARE ISSUED UNDER PGMA 21-700

REV	DATE	ALTD: A.S	REV.	DATE	ALTERED: CHD & APPD: K.S	MATERIAL SPECN:- ALTERED FOR IT. NO. 02 & 03
02	04-04-95	CHD & APPD: C.	01	11/9/97		SPRING TYPE REVISED IN ITEM No. 01

TYPE OF PRODUCT OR NAME OF CUSTOMER/PROJECT

Bharat Heavy Electricals Ltd.,
BOILER PLANT UNIT
TIRUCHIRAPALLI — 620 014

	NAME	SIGN.	DATE	NO. OF VAR.
DRN.	I.G. Sekaran			
CHD.	K. Sridhar.	K.Sridhar	3/3/93	
APPD.	M.K.T.		03/09/93	

DEPT. CODE	GRADE OF UNTOL. DIM.	SCALE	WEIGHT (kg.)	REF. TO ASSY./OLD DRG.	ITEM NO.
PP/BM 121	C/M/F	1:1	1	3-21-601-00261	

TITLE: SINGLE TIE ROD HANGER 2" WITH S.C.A

CARD CODE: U 01

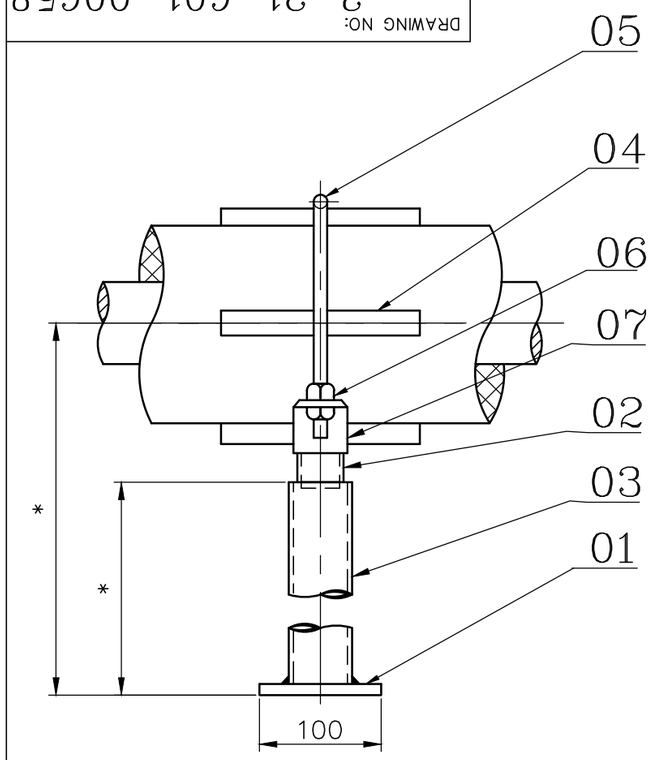
DRAWING NO.: 3-21-601-00583

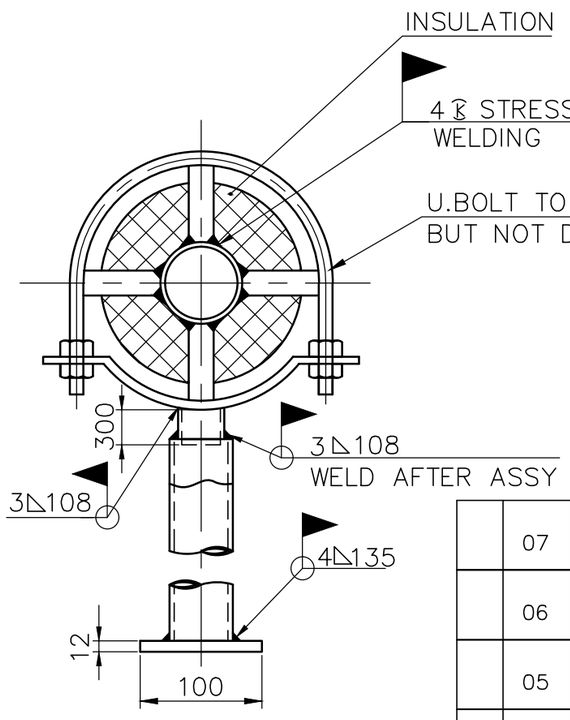
REV.: 02

Size A3

TP-DG-3-21-601-00583
CORPORATE DRG ID

DRAWING NO: 3-21-601-00658





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

NOTES:

1. ITEM NOS 01 TO 04 ARE ISSUED UNDER PGMA 21-601
2. ITEM NOS 05 TO 07 ARE ISSUED UNDER PGMA 21-700
* 3. LENGTH TO BE ADJUSTED AT SITE TO SUIT THE REQUIRED SLOPE

FOR TENDER PURPOSE ONLY

VARIANT NUMBER	ITEM NUMBER	DESCRIPTION	STD	DRAWING NUMBER	ITEM NO / VAR NO	MATERIAL CODE / MATERIAL SPECN	A/C/P / DI	UNIT / QUANTITY	UNIT WEIGHT	GS
	07	SUPPORT PL.	S	7740 43 3021		942860020000			1.541	
									1	
	06	NUT HEX M 12	S	413 04 12000		41304 00 012			0.017	
									4	
	05	U BOLT DM ON SUPPL NB 65	S	7740 25 4021		942251180000			1.170	
									1	
	04	PIPE GUIDE (INSLN & SUPPL)OD 60.3		3-21-601-00654		159422800000			1.600	
					02	SA387 GR.12CL.2			4	
	03	ERW TUBE NB32 MEDIUM (D42.9 X 3.2)				150386265300			1.570	
						IS1161YST 240			1	
	02	ERW TUBE NB25 MEDIUM (D34.2 X 3.2)				150386325300			0.733	
						IS1161YST 240			1	
	01	PL 10 X 100 X 100				150110980000			0.785	
						IS2062FE410A			1	

TYPE OF WELD	TYPE OF ELECTRODE	WELD LENGTH IN M	REMARKS
4△	E7018	0.135	–
3△	E7018	0.216	–
4 ⟆	E8018-B2	0.600	–

WELDING CHART

REV	DATE	ALTERED :
01		CHD & APPD:
ZONE		

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TYPE OF PRODUCT OR NAME OF CUSTOMER/PROJECT

Bharat Heavy Electricals Ltd
UNIT: HIGH PRESSURE BOILER PLANT
TIRUCHIRAPALLI – 620014
355-055

	NAME	SIGNATURE	DATE
DRN	B.SIVARAJ		02.07.11
CHD	C.ARIVAZHAGAN		02.07.11
APPD	C.ARIVAZHAGAN		02.07.11

DEPT	ALL DIMENSIONS ARE IN MM	PROJECTION	SCALE	WEIGHT (Kg)	REF TO ASSY / OLD DWG
PP/BM			NTS	12.267	
CODE 121					

TITLE: PIPE SADDLE D.60.3

DRAWING NO : 3-21-601-00658 REV 00

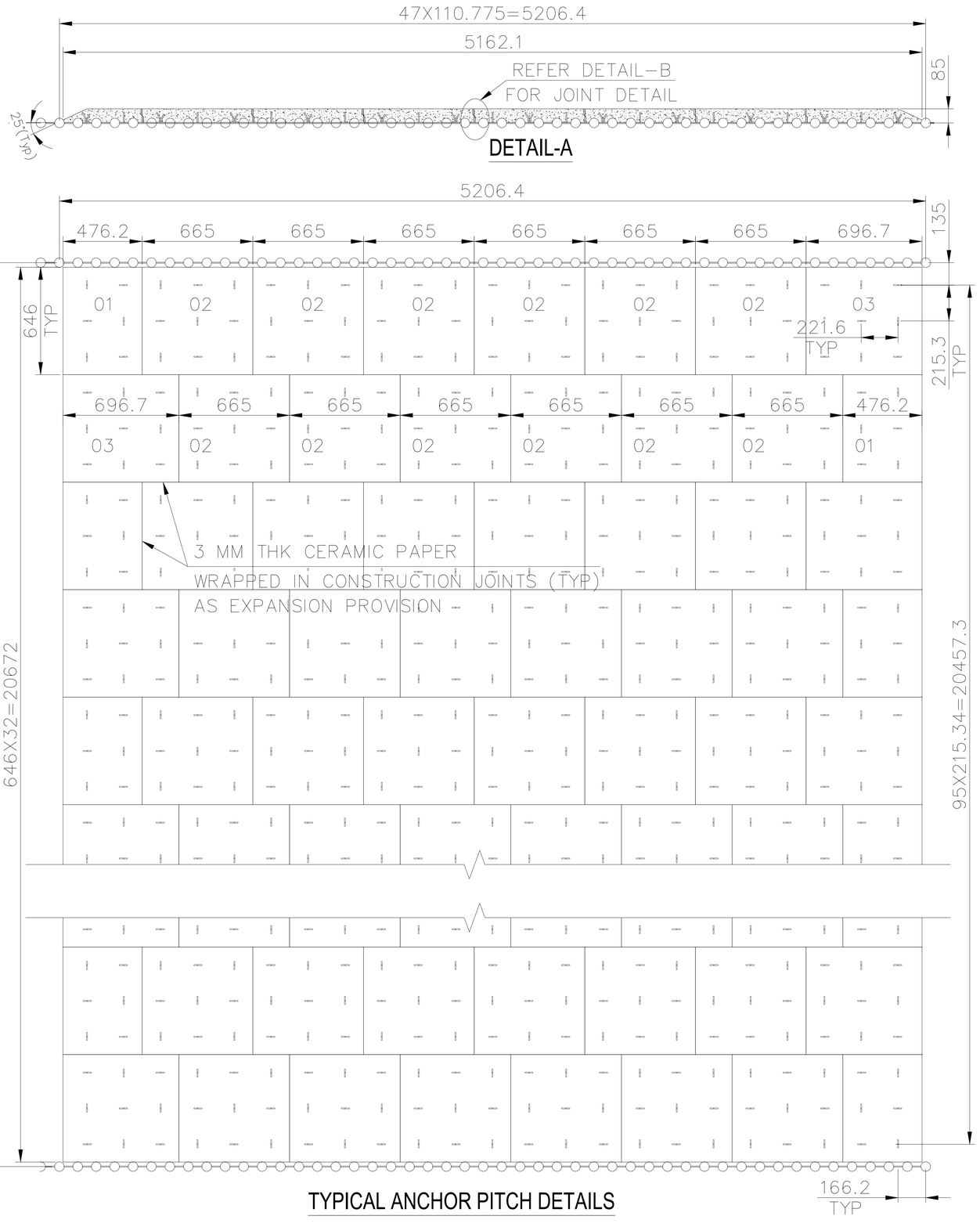
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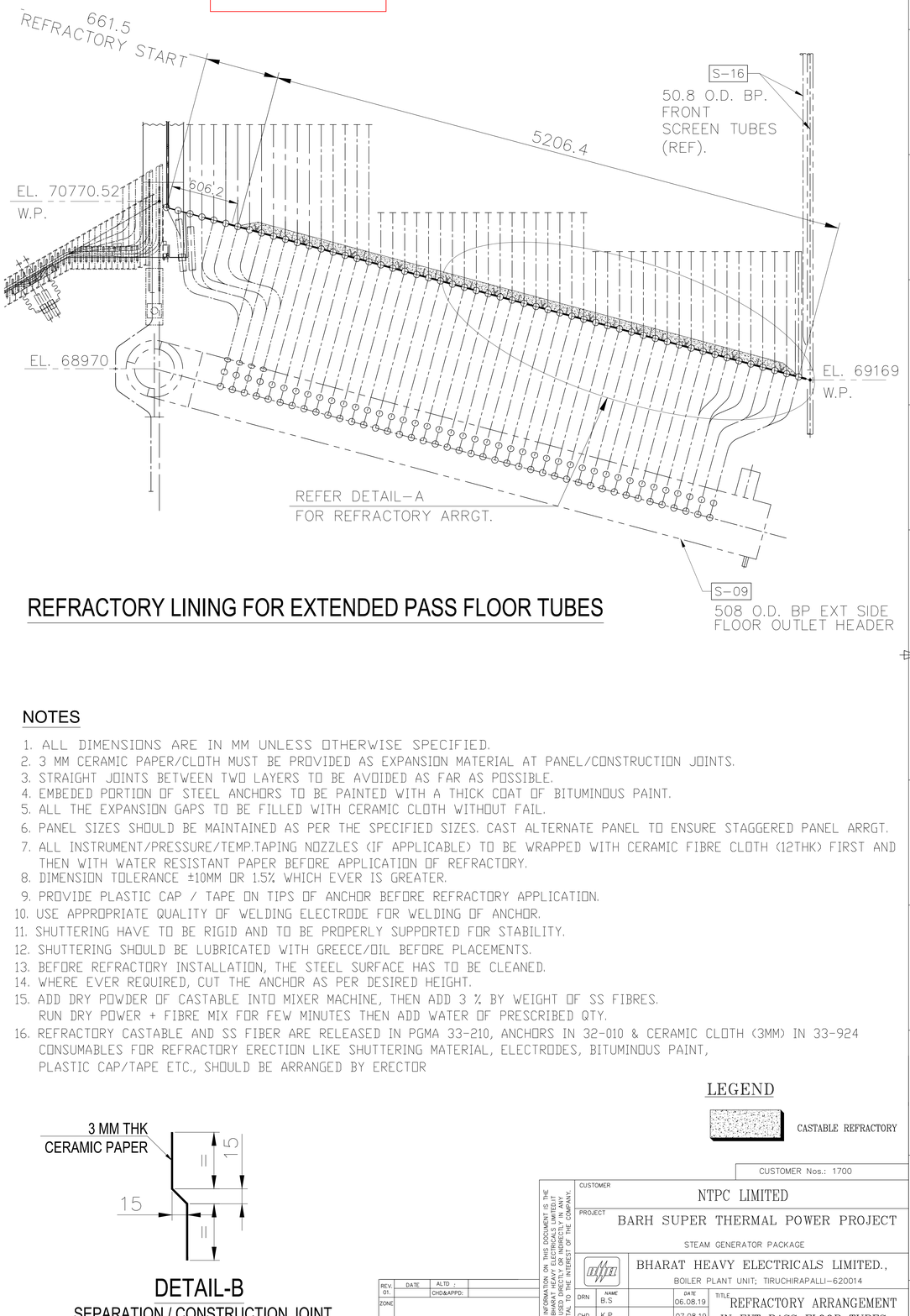
CORPORATE DRG ID:TP-DG-0-00-205-24261/00

DRAWING NO 0-00-205-24261

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

FOR TENDER PUPOSE ONLY





REFRACTORY LINING FOR EXTENDED PASS FLOOR TUBES

NOTES

1. ALL DIMENSIONS ARE IN MM UNLESS OTHERWISE SPECIFIED.
2. 3 MM CERAMIC PAPER/CLOTH MUST BE PROVIDED AS EXPANSION MATERIAL AT PANEL/CONSTRUCTION JOINTS.
3. STRAIGHT JOINTS BETWEEN TWO LAYERS TO BE AVOIDED AS FAR AS POSSIBLE.
4. EMBEDED PORTION OF STEEL ANCHORS TO BE PAINTED WITH A THICK COAT OF BITUMINOUS PAINT.
5. ALL THE EXPANSION GAPS TO BE FILLED WITH CERAMIC CLOTH WITHOUT FAIL.
6. PANEL SIZES SHOULD BE MAINTAINED AS PER THE SPECIFIED SIZES. CAST ALTERNATE PANEL TO ENSURE STAGGERED PANEL ARRGT.
7. ALL INSTRUMENT/PRESSURE/TEMP.TAPING NOZZLES (IF APPLICABLE) TO BE WRAPPED WITH CERAMIC FIBRE CLOTH (12THK) FIRST AND THEN WITH WATER RESISTANT PAPER BEFORE APPLICATION OF REFRACTORY.
8. DIMENSION TOLERANCE ±10MM OR 1.5% WHICH EVER IS GREATER.
9. PROVIDE PLASTIC CAP / TAPE ON TIPS OF ANCHOR BEFORE REFRACTORY APPLICATION.
10. USE APPROPRIATE QUALITY OF WELDING ELECTRODE FOR WELDING OF ANCHOR.
11. SHUTTERING HAVE TO BE RIGID AND TO BE PROPERLY SUPPORTED FOR STABILITY.
12. SHUTTERING SHOULD BE LUBRICATED WITH GREECE/OIL BEFORE PLACEMENTS.
13. BEFORE REFRACTORY INSTALLATION, THE STEEL SURFACE HAS TO BE CLEANED.
14. WHERE EVER REQUIRED, CUT THE ANCHOR AS PER DESIRED HEIGHT.
15. ADD DRY POWDER OF CASTABLE INTO MIXER MACHINE, THEN ADD 3 % BY WEIGHT OF SS FIBRES. RUN DRY POWER + FIBRE MIX FOR FEW MINUTES THEN ADD WATER OF PRESCRIBED QTY.
16. REFRACTORY CASTABLE AND SS FIBER ARE RELEASED IN PGMA 33-210, ANCHORS IN 32-010 & CERAMIC CLOTH (3MM) IN 33-924 CONSUMABLES FOR REFRACTORY ERECTION LIKE SHUTTERING MATERIAL, ELECTRODES, BITUMINOUS PAINT, PLASTIC CAP/TAPE ETC., SHOULD BE ARRANGED BY ERECTOR

DETAIL-B
SEPARATION / CONSTRUCTION JOINT
FOR DENSE CASTABLE

LEGEND

CASTABLE REFRACTORY

REV.	DATE	ALTD :
01.		CHD&APPD:

ZONE

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CUSTOMER Nos.: 1700

CUSTOMER: NTPC LIMITED

PROJECT: BARH SUPER THERMAL POWER PROJECT

STEAM GENERATOR PACKAGE

BHARAT HEAVY ELECTRICALS LIMITED.,
BOILER PLANT UNIT; TIRUCHIRAPALLI-620014

	NAME	DATE
DRN	B.S	06.08.19
CHD	K.P	07.08.19
APPD	N.S.R	07.08.19

TITLE: REFRACTORY ARRANGEMENT IN EXT PASS FLOOR TUBES

SHEET 01 OF 01

ALL DIMENSIONS IN MILLIMETRE | PROJECTION | SCALE NTS | DRG.NO. 0-00-205-24261 | REV. 00

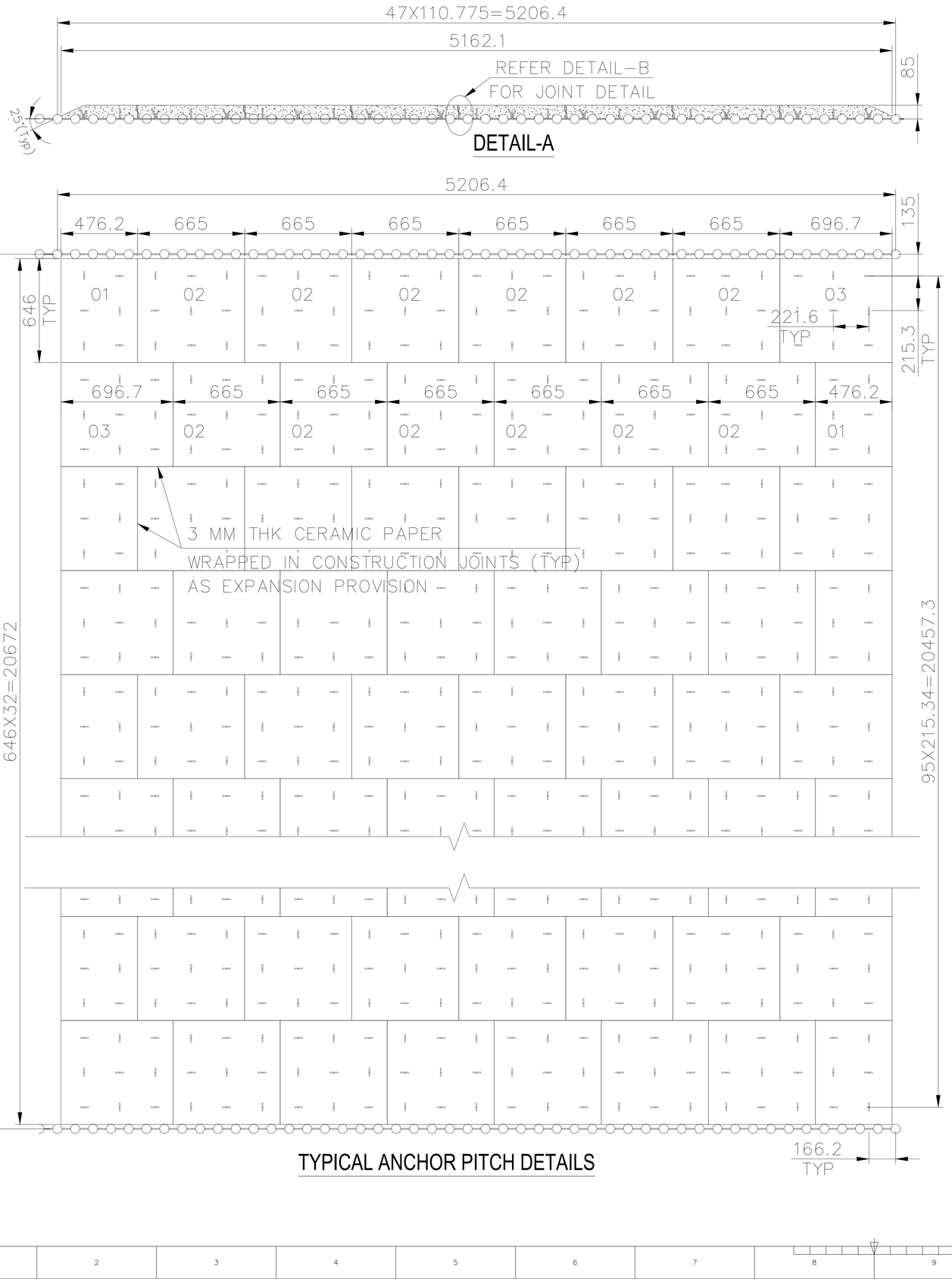
CORPORATE DRG ID:TP-DG-0-00-205-24261/00

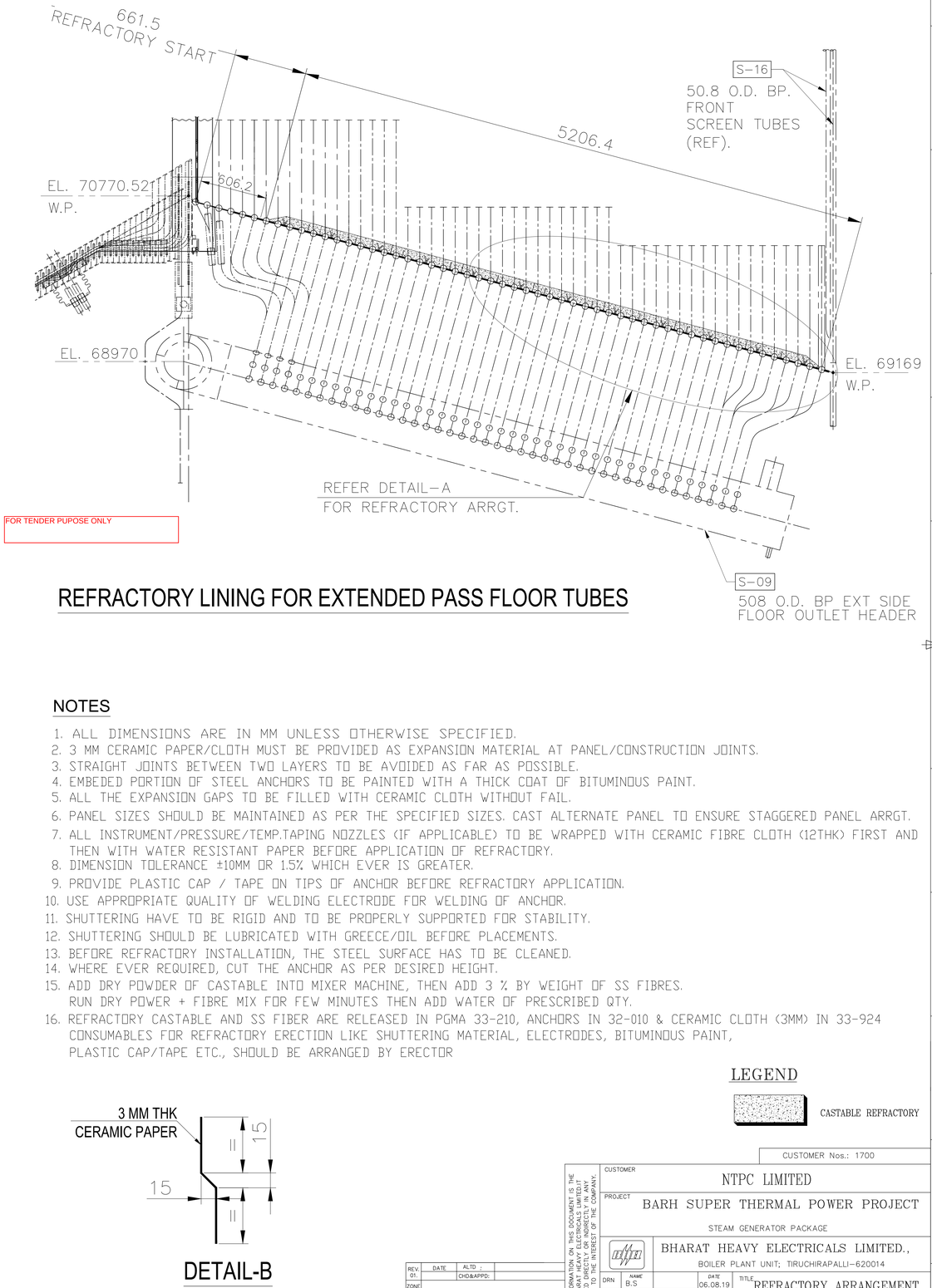
E-TENDER ENQUIRY NO.: PSER:PUR:BRH-S434:20 (ENQ:20:PP:0015:PUR:88) Date 05/03/2021.

CORPORATE DRG ID:TP-DG-0-00-205-24261/00

DRAWING NO 0-00-205-24261

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





FOR TENDER PUPOSE ONLY

REFRACTORY LINING FOR EXTENDED PASS FLOOR TUBES

NOTES

1. ALL DIMENSIONS ARE IN MM UNLESS OTHERWISE SPECIFIED.
2. 3 MM CERAMIC PAPER/CLOTH MUST BE PROVIDED AS EXPANSION MATERIAL AT PANEL/CONSTRUCTION JOINTS.
3. STRAIGHT JOINTS BETWEEN TWO LAYERS TO BE AVOIDED AS FAR AS POSSIBLE.
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13. BEFORE REFRACTORY INSTALLATION, THE STEEL SURFACE HAS TO BE CLEANED.
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DETAIL-B
SEPARATION / CONSTRUCTION JOINT
FOR DENSE CASTABLE

LEGEND

CASTABLE REFRACTORY

REV.	DATE	ALTD :
01.		CHD&APPD:
ZONE		

CUSTOMER Nos.: 1700

CUSTOMER: NTPC LIMITED

PROJECT: BARH SUPER THERMAL POWER PROJECT

STEAM GENERATOR PACKAGE

BHARAT HEAVY ELECTRICALS LIMITED.,
BOILER PLANT UNIT; TIRUCHIRAPALLI-620014

	NAME	DATE
DRN	B.S	06.08.19
CHD	K.P	07.08.19
APPD	N.S.R	07.08.19

TITLE: REFRACTORY ARRANGEMENT IN EXT PASS FLOOR TUBES

SHEET 01 OF 01

ALL DIMENSIONS IN MILLIMETRE | PROJECTION | SCALE NTS | DRG.NO. 0-00-205-24261 | REV. 00

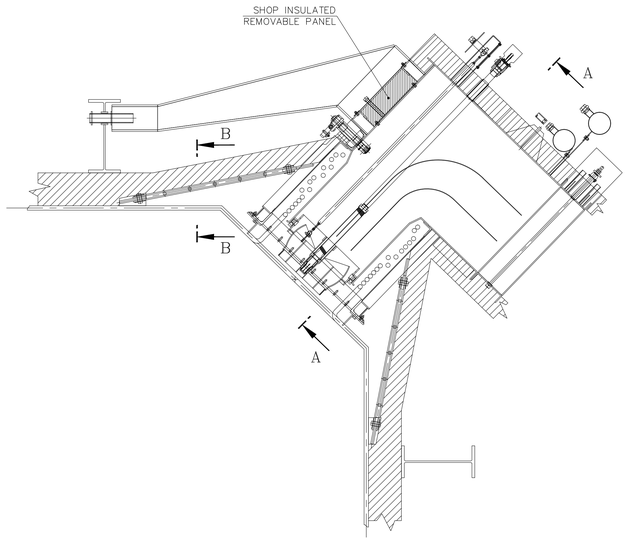
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CORPORATE DRG ID:TP-DG-0-00-205-24261/00

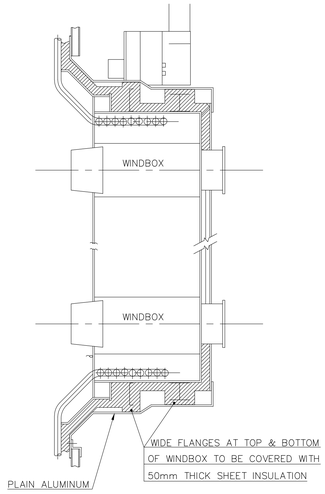
E-TENDER ENQUIRY NO.: PSER:PUR:BRH-S434:20 (ENQ:20:PP:0015:PUR:88) Date 05/03/2021.

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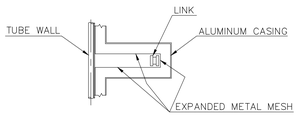
FOR TOLERANCES OF UNTOLERANCED DIMENSIONS DURING MANUFACTURE REFER PLANT STD. NO TP 023 0299



PLAN VIEW SECTION
WIND BOX DUCT

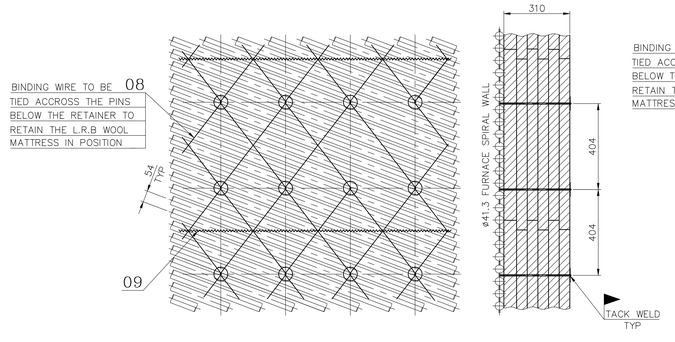


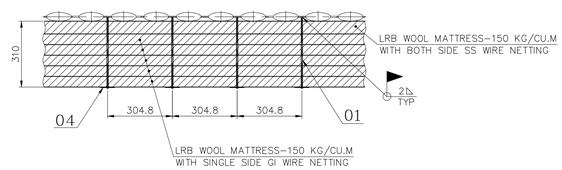
SECTION–AA



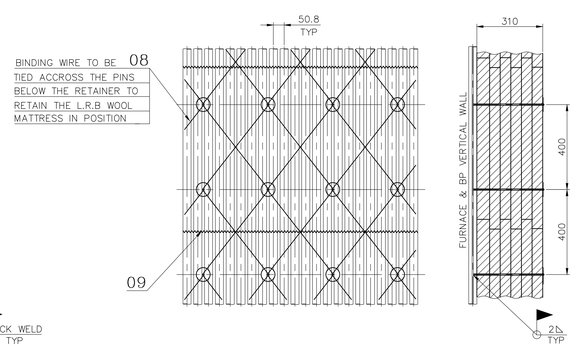
SECTION–BB

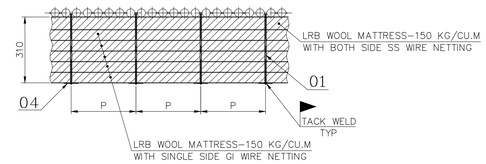
LINKS ARE TO BE KEPT HOT
CONTRACTOR TO INSULATE AND CASE ALL TENSION LINKS
ON BURNER WINDBOXES PRIOR TO BOILOUT. ENSURE INSULATION AND CASING
DOES NOT INTERFERE WITH NOZZLE AND DAMPER LINKAGES.





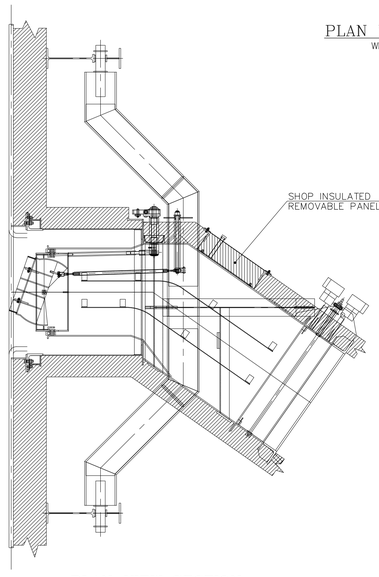
FIXING ARRGT OF INSULATION ON
FURNACE SPIRAL WALL



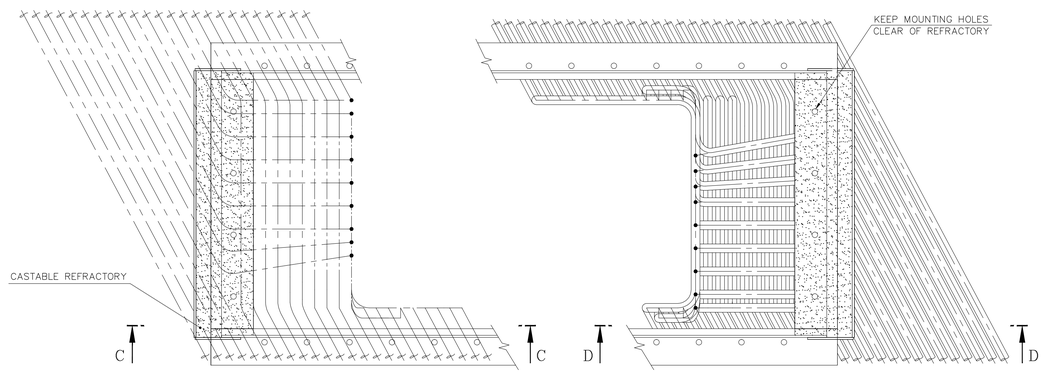


P=304.8 FOR ø38.1 @ 50.8 MM PITCH–FUNACE FRONT,REAR & SIDES
P=304.8 FOR ø44.5 @ 101.6 MM PITCH–BP REAR WALL
P=304.8 FOR ø50.8 @ 101.6 MM PITCH–BP FRONT WALL
P=250.0 FOR ø57.2 @ 125 MM PITCH–BP SIDE WALLS

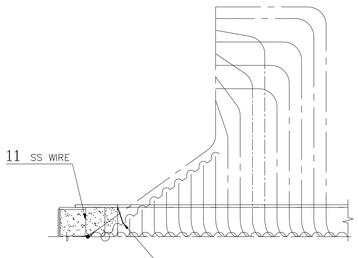
FIXING ARRGT OF INSULATION ON
FURNACE & BP VERTICAL WALLS



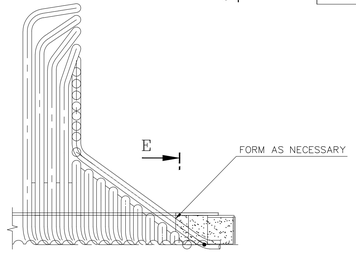
PLAN VIEW SECTION
SOFA REGISTER DUCT



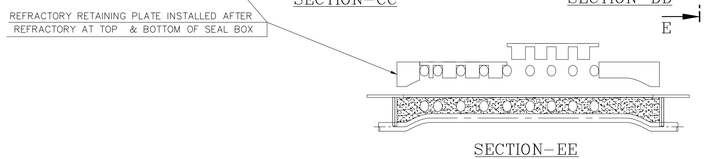
BURNER AND SOFA WINDBOX



SECTION–CC



SECTION–DD



SECTION–EE

LEGEND:

CASTABLE REFRACTORY TYPE–A

LIGHTLY BONDED WOOL MATTRESS

FOR DOOR ERECTION DETAILS
REFER DRG. NOS.

0–00–205–20970
0–00–205–20971
0–00–205–20972
0–00–205–20973
0–00–205–20974

FOR TENDER PUPOSE ONLY

NOTES:

01. MATERIALS ARE RELEASED UNDER PGMA 30–215.
02. MINERAL WOOL MATTRESSES SHOULD BE FIXED WITH STAGGRED JOINTS WHEREVER MORE THAN ONE LAYER IS USED.(USE SEWING WIRE FOR TIEING ADJUSTANT MATTRESS)
03. IN PLAIN SHEETS & SKIN CASING AREAS HOOKS ARE TO BE WELDED WITH 250MM & 400MM PITCHES
04. BUCKSTAYS WITH HINGE OR GATE TYPE STIRRUPS AND OTHER AREAS SHALL BE PACKED WITH LOOSE WOOL IN CORNERS AS SHOWN IN THE DRAWING.
05. FOR DIMENSIONS & ARRANGEMENT OF FURNACE AND BOILER, THE GENERAL ARRGT DRAWING WILL GOVERN, THESE DRAWINGS ILLUSTRATE TYPICAL CONSTRUCTION OF INSULATION AND REFRACTORY ONLY.
06. APPLY INSULATION ONLY AFTER COMPLETION OF AIR LEAK TEST IN FURNACE. AIR LEAK TEST TO BE DONE AFTER COMPLETING ALL REFRACTORY AND SKIN CASING ARRANGEMENTS BY RUNNING THE F.D. FAN AND CHECK FOR LEAK IN SKIN CASING.
07. COAT ALL HANGER RODS AND PIPES WITH A COAT OF CUP GREASE WHEREVER THEY COME IN CONTACT WITH POURABLE INSULATION.
08. THE APPLICATION AND CURING OF CASTABLE REFRACTORY AND POURABLE INSULATION AS PER DRG NOS. 4–00–205–08525 TO 4–00–205–08529 SHOULD BE STRICTLY FOLLOWED TO ACHIEVE BETTER RESULT.
09. NECESSARY CUTTING AND FABRICATION MAY BE DONE AT SITE ACCORDING TO SITE CONDITIONS AND REQUIREMENTS.
10. THE TUBES WHICH ARE EMBEDED IN CASTABLE REFRACTORY SHALL BE COATED WITH A THICK COAT OF BLACK BITUMASTIC PAINT BEFORE APPLYING CASTABLE REFRACTORY.
11. IN PLACE OF MASS APPLICATION OF CASTABLE REFRACTORY 1mm THICK CARD BOARD IS TO BE PROVIDED AT A PITCH OF ~600mm FOR EXPANSION.
12. 5MM GAP SHOULD BE PROVIDED AS EXPANSION GAP IN CASTABLE REFRACTORY AT EVERY 750MM.
13. FOR LINING AROUND OPENINGS AND OTHER DETAILS REFER PGMA 00–230.
14. WOOL MATTRESSES ARE ENVISAGED UNDER PGMA 33–021.
15. CASTABLE REFRACTORY IS ISSUED UNDER PGMA 33–212.
16. POURABLE INSULATION IS ISSUED IN PGMA 33–230.

REV.	DATE	ALTD :
01.		CHD&APPD:

ZONE

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CUSTOMER Nos.: 1700, 1701

CUSTOMER: NTPC LIMITED

PROJECT: BARH SUPER THERMAL POWER PROJECT
STAGE–II (2x660MW) – UNIT NO 4&5
STEAM GENERATOR PACKAGE

BHARAT HEAVY ELECTRICALS LIMITED.,
BOILER PLANT UNIT; TIRUCHIRAPALLI–620014

	NAME	DATE
DRN	C.S.RAJ	20.02.12
CHD	C.G.S	22.02.12
APPD	C.G.S	24.02.12

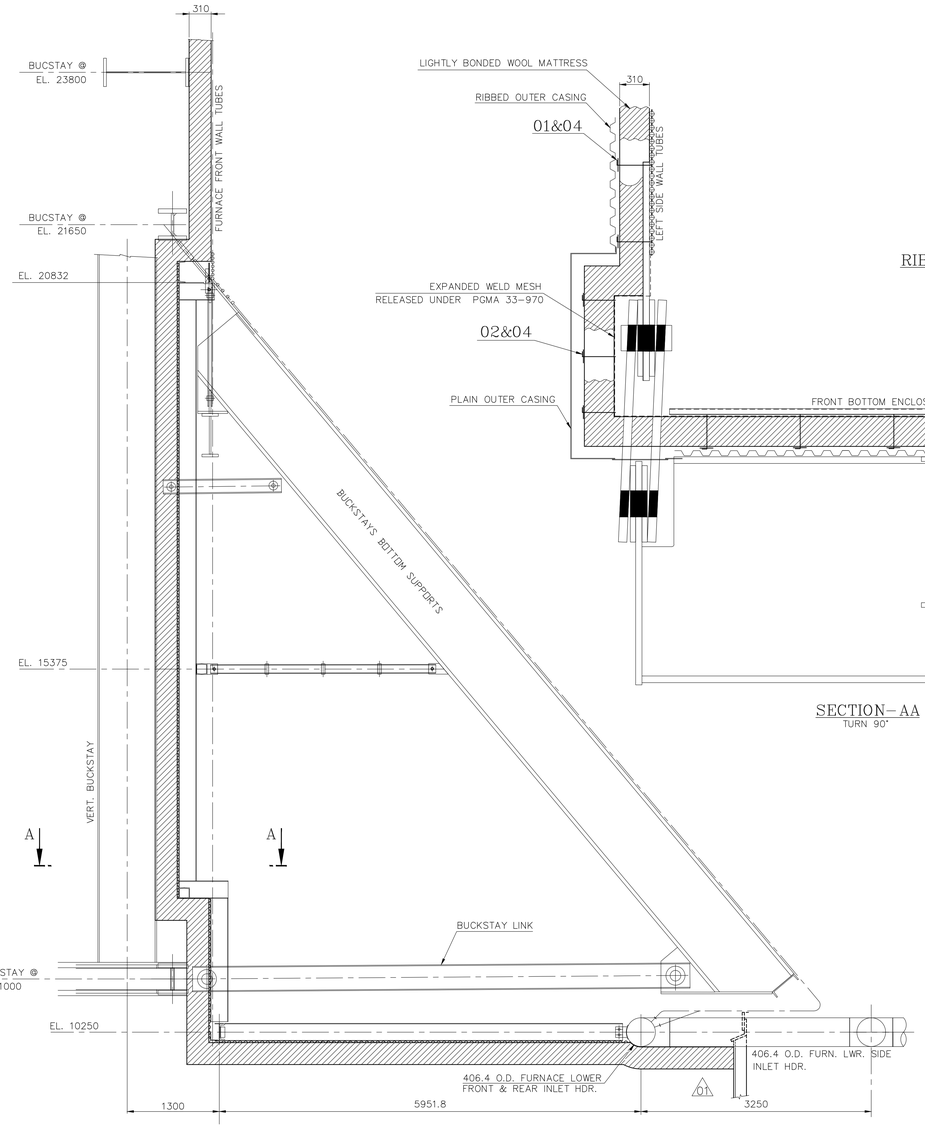
TITLE: WIND BOX & SOFA DUCTS
INSUL & REF ARRANGEMENT
SHEET 01 OF 06

ALL DIMENSIONS IN MILLIMETRE | PROJECTION | SCALE 1:125 | DRG.NO. 0–00–205–20969 | REV. 00

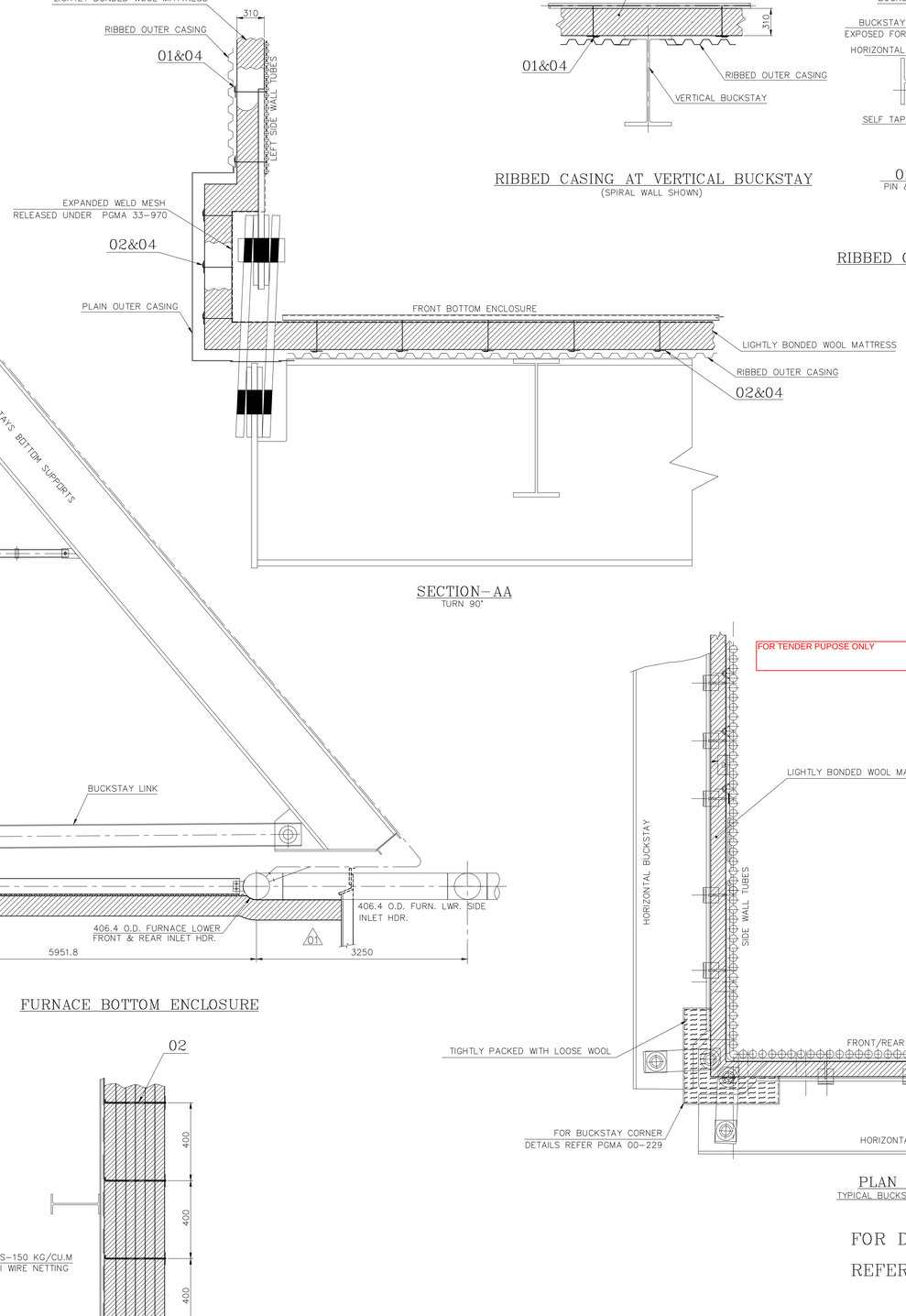
E-TENDER ENQUIRY NO.: PSER:PUR:BRH-S434:20 (ENQ:20:PP:0015:PUR:88) Date 05/03/2021.

DRAWING NO: 0-00-205-20970

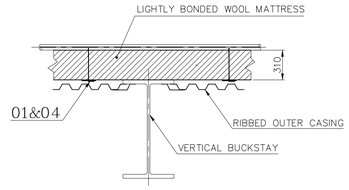
ALL DIMENSIONS ARE IN MM
FOR TOLERANCES OF UNTOLERANCED DIMENSIONS DURING MANUFACTURE REFER RELEVANT QCP / QP



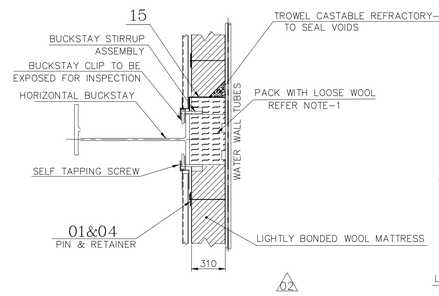
FURNACE BOTTOM ENCLOSURE



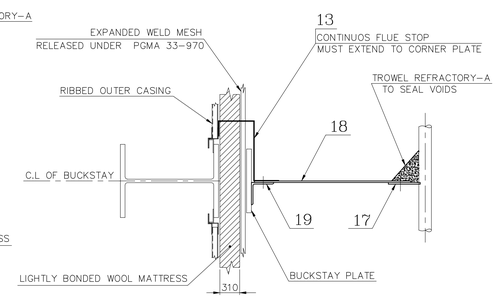
SECTION-AA
TURN 90°



RIBBED CASING AT VERTICAL BUCKSTAY
(SPIRAL WALL SHOWN)

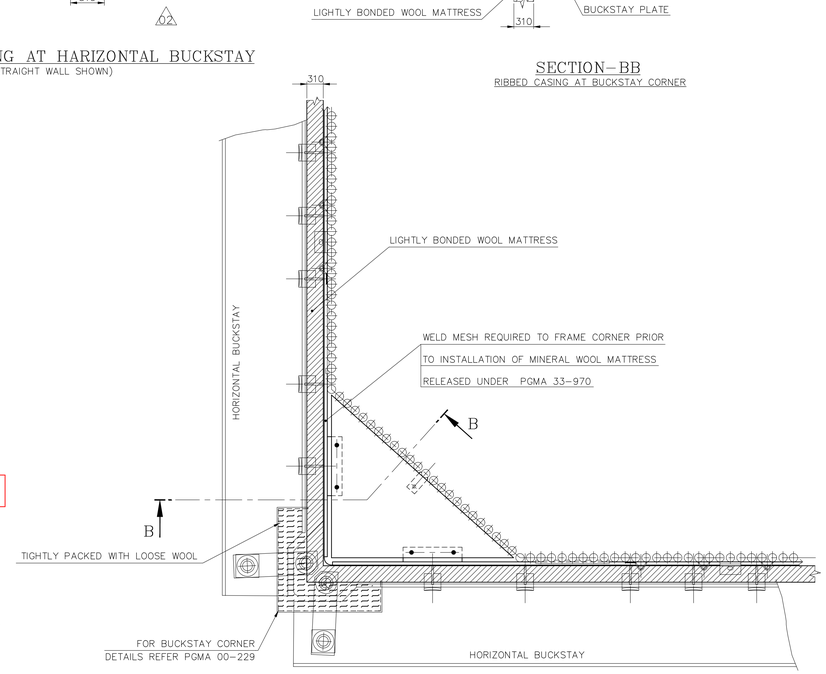


RIBBED CASING AT HARIZONTAL BUCKSTAY
(STRAIGHT WALL SHOWN)

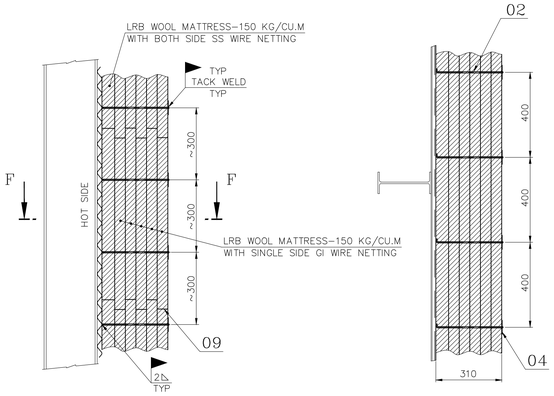


SECTION-BB
RIBBED CASING AT BUCKSTAY CORNER

PLAN VIEW
TYPICAL BUCKSTAY CORNER 02



PLAN VIEW
BUCKSTAY CORNER AT WINDBOX 02



FIXING DETAIL OF INSULATION ON FURNACE ENCL CORRUGATED SHEETS

SECTION-FF

LEGEND:

- CASTABLE REFRACTORY TYPE-A
- LIGHTLY BONDED WOOL MATTRESS
- LOOSE WOOL DENSITY 150 Kgs/M

NOTE:

1. FILL THE AREA BEHIND BUCKSTAY WITH LOOSE WOOL.
   LOOSE WOOL TO BE TIGHTLY PACKED AND ABOVE IT BENT SHEET (ITEM NO.15) TO BE FIXED.

FOR DOOR ERECTION DETAILS
REFER DRG. NOS.

0-00-205-20969
0-00-205-20971
0-00-205-20972
0-00-205-20973
0-00-205-20974

REV.	DATE	ALTD :	
02	28.01.17	CHD&APPD:	K.SELVAM

ZONE: STRAIGHT WALL HORIZONTAL BUCKSTAY & PLAN VIEW OF BUCKSTAY CORNER AT WINDBOX DETAILS ALTERED

REV.	DATE	ALTD :	
01	04.12.15	CHD&APPD:	K.S

ZONE: FURNACE BOTTOM ENCLOSURE INSULATION ARRANGEMENT DETAIL ALTERED

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CUSTOMER Nos.: 1700, 1701

CUSTOMER: NTPC LIMITED

PROJECT: BARH SUPER THERMAL POWER PROJECT
STAGE-II (2x660MW) - UNIT NO 4&5
STEAM GENERATOR PACKAGE

BHARAT HEAVY ELECTRICALS LIMITED.,
BOILER PLANT UNIT; TIRUCHIRAPALLI-620014

	NAME	DATE
DRN	C.S.RAJ	20.02.12
CHD	C.G.S	22.02.12
APPD	C.G.S	24.02.12

TITLE: BOILER BUCKSTAY INSUL & REF ARRANGEMENT
SHEET 02 OF 06

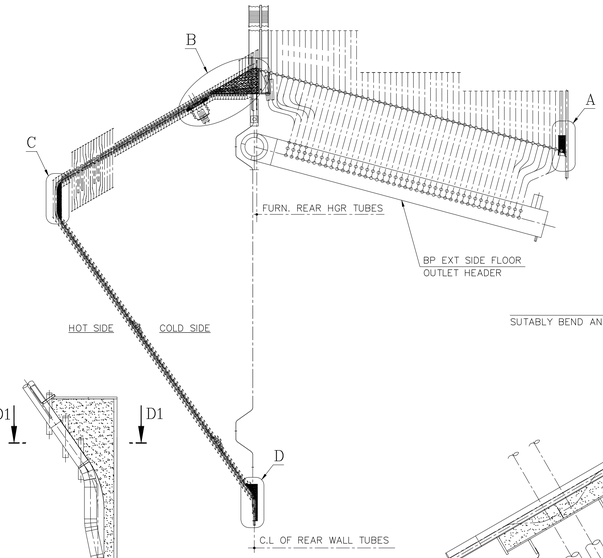
ALL DIMENSIONS IN MILLIMETRE | PROJECTION | SCALE: N T S

DRG.NO. 0-00-205-20970 REV. 02

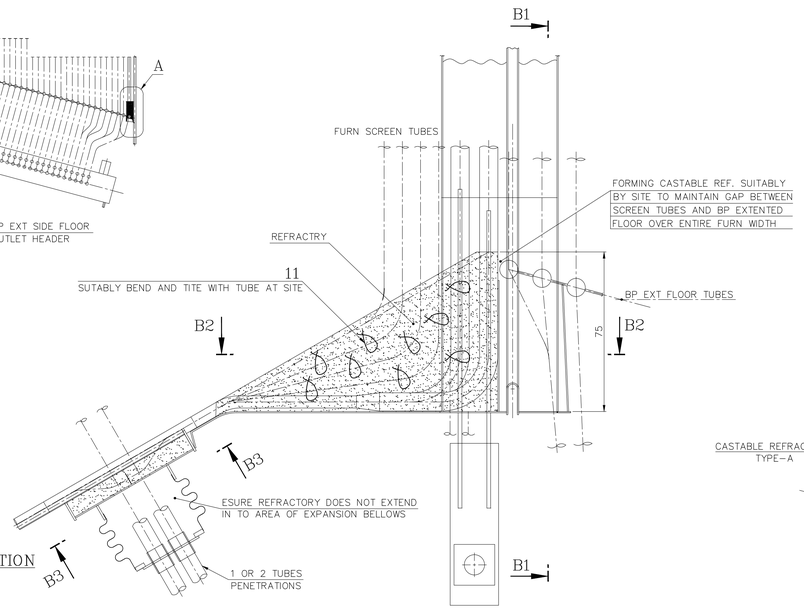
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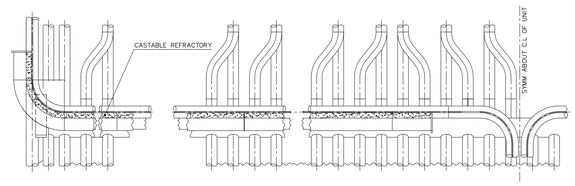
DRAWING NO: 0-00-205-20971

ALL DIMENSIONS ARE IN MM
FOR TOLERANCES OF UNTOLERANCED DIMENSIONS DURING MANUFACTURE REFER RELEVANT QCP / QP

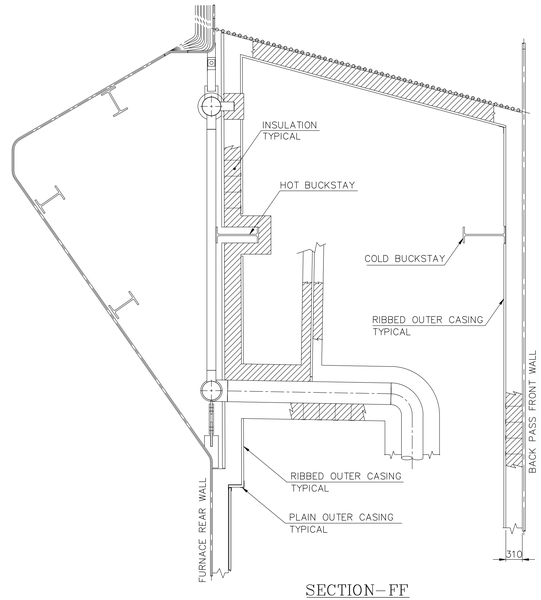


REAR ARCH RIGHT SIDE ELEVATION
REFRACTORY ARRANGEMENT

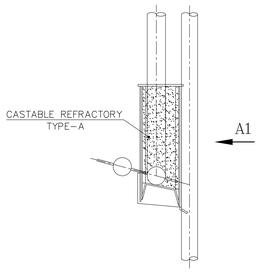




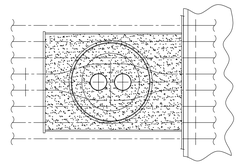
VIEW–A1
BACK PASS



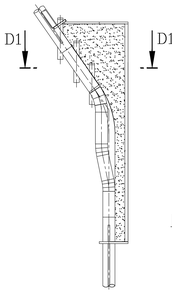
SECTION–FF
INSULATION ARRANGEMENT



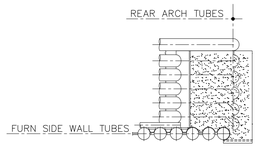
DETAIL–A
BACK PSS



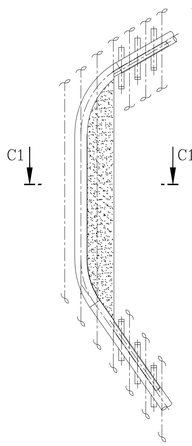
SECTION–B3B3
SPACER TUBES

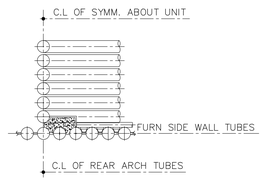


DETAIL–D
LOWER REAR ARCH



SECTION–D1D1
LOWER REAR ARCH CORNER

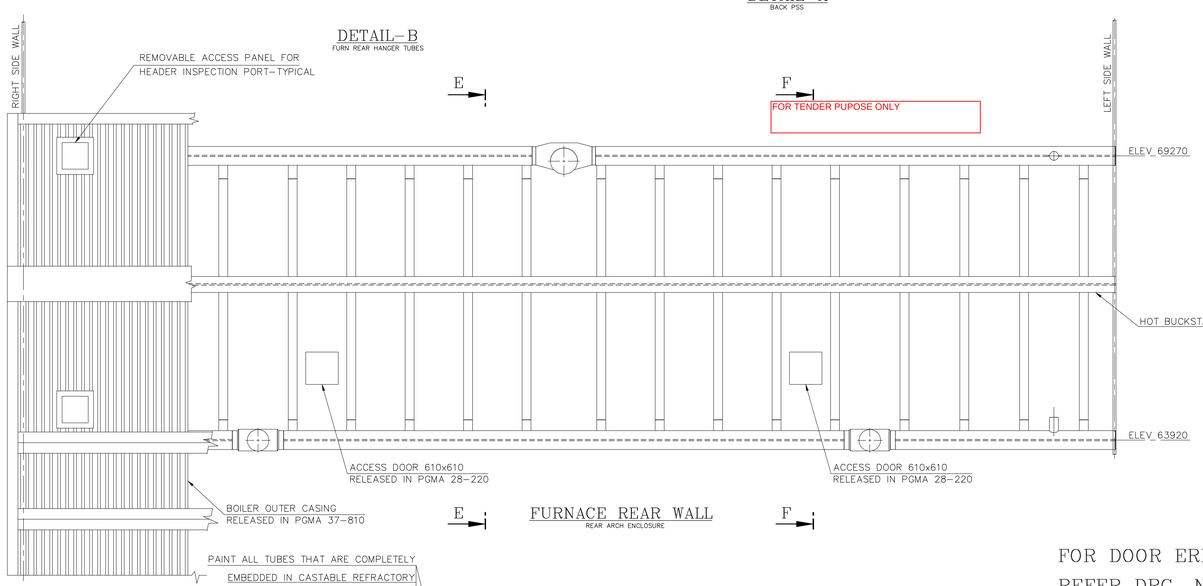




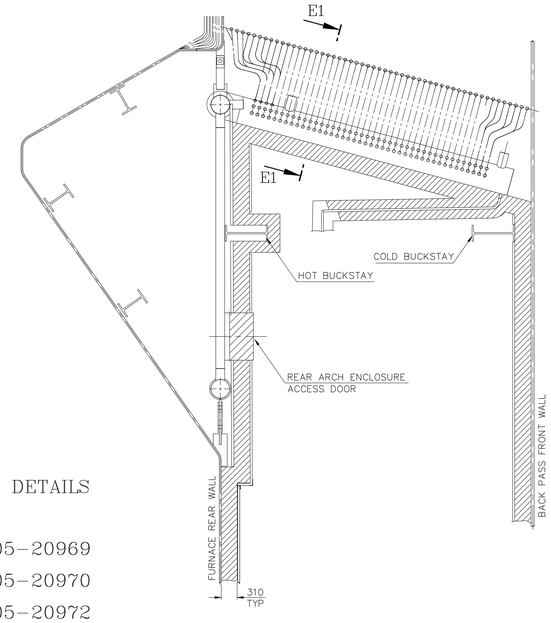
SECTION–C1C1
REAR ARCH CORNER

DETAIL–C
REAR ARCH

DETAIL–B
FURN REAR HANGER TUBES



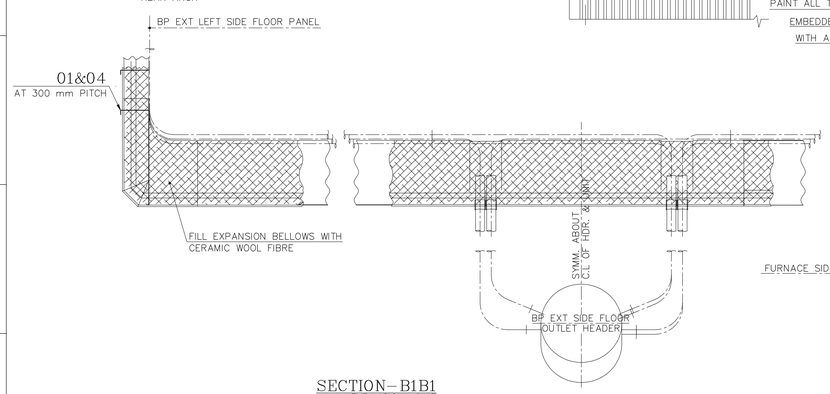
FURNACE REAR WALL
REAR ARCH ENCLOSURE



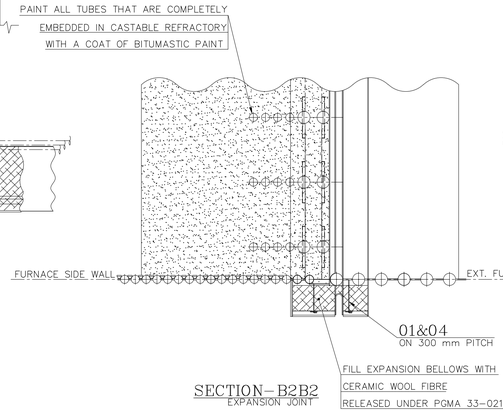
SECTION–EE
INSULATION ARRANGEMENT

FOR DOOR ERECTION DETAILS REFER DRG. NOS.

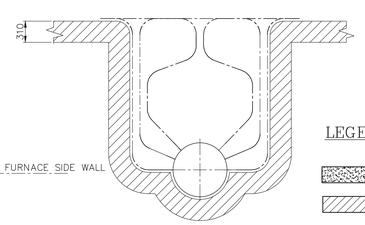
0–00–205–20969
0–00–205–20970
0–00–205–20972
0–00–205–20973
0–00–205–20974



SECTION–B1B1
EXPANSION JOINT



SECTION–B2B2
EXPANSION JOINT



SECTION–E1E1

LEGEND:

- CASTABLE REFRACTORY TYPE–A
- LIGHTLY BONDED WOOL MATTRESS
- CERAMIC WOOL FIBRE

REV.	DATE	ALTD :
01.		CHD&APPD:
ZONE		

CUSTOMER Nos.: 1700, 1701

CUSTOMER: NTPC LIMITED

PROJECT: BARH SUPER THERMAL POWER PROJECT
STAGE–II (2x660MW) – UNIT NO 4&5
STEAM GENERATOR PACKAGE

BHARAT HEAVY ELECTRICALS LIMITED.,
BOILER PLANT UNIT; TIRUCHIRAPALLI–620014

	NAME	DATE
DRN	C.S.RAJ	20.02.12
CHD	C.G.S	22.02.12
APPD	C.G.S	24.02.12

TITLE: REAR ARCH ENCLOSURE INSUL & REF ARRANGEMENT
SHEET 03 OF 06

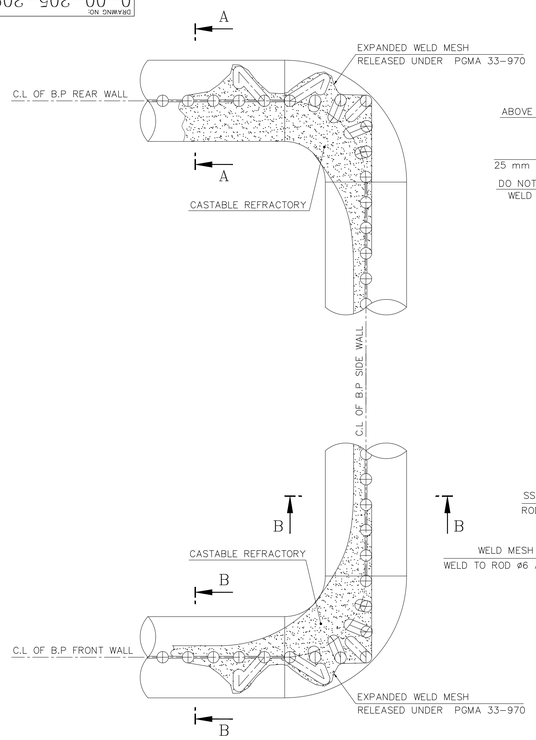
ALL DIMENSIONS IN MILLIMETRE | PROJECTION | SCALE N T S | DRG.NO. 0–00–205–20971 | REV. 00

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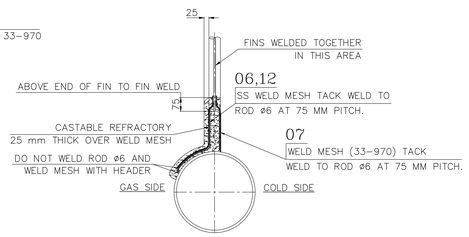
E-TENDER ENQUIRY NO.: PSER:PUR:BRH-S434:20 (ENQ:20:PP:0015:PUR:88) Date 05/03/2021.

DRAWING NO: 0-00-205-20972

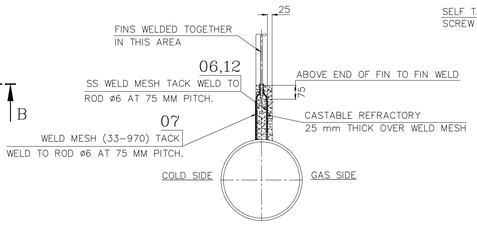
ALL DIMENSIONS ARE IN MM
FOR TOLERANCES OF UNTOLERANCED DIMENSIONS DURING MANUFACTURE REFER RELEVANT QCP / QP



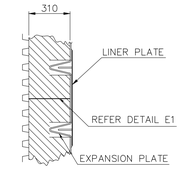
REFRACTORY AT LOWER BACK PASS HEADER



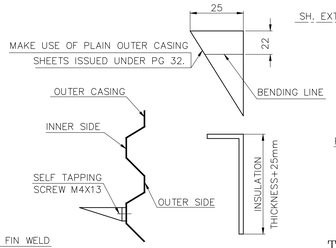
SECTION-AA
REFRACTORY AT LOWER BACKPASS HEADER



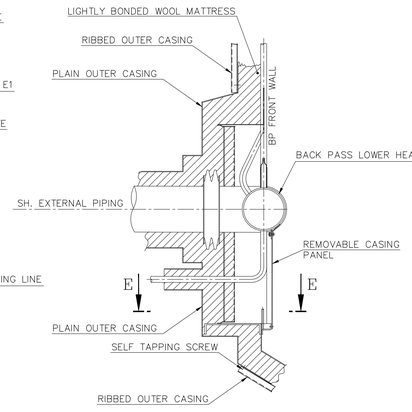
SECTION-BB
REFRACTORY AT LOWER BACKPASS HEADER



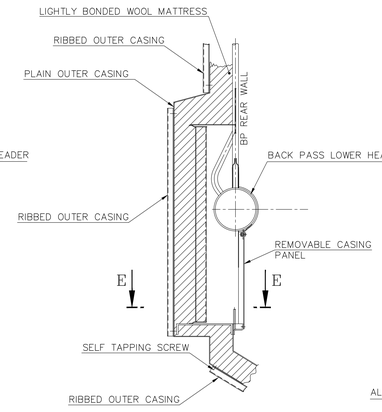
SECTION-EE



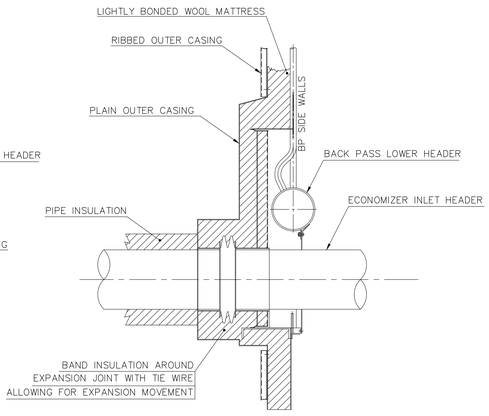
DETAIL-E1



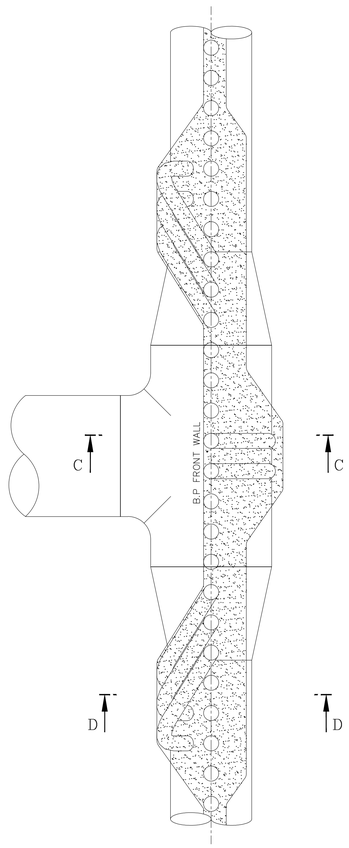
TYP. METHOD OF INSULATING
EXPANSION PLATE AT BOILER OUTLET
(FRONT WALL)



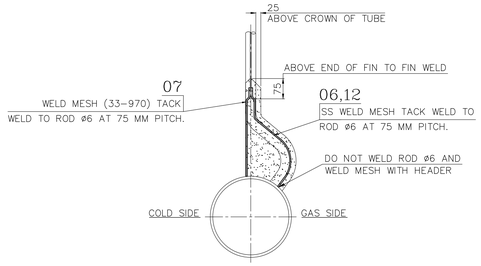
TYP. METHOD OF INSULATING
EXPANSION PLATE AT BOILER OUTLET
(REAR WALL)



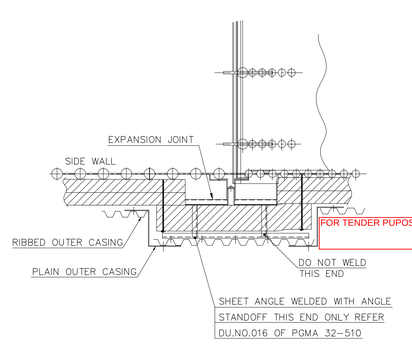
TYP. METHOD OF INSULATING
EXPANSION PLATE AT BOILER OUTLET
(SIDE WALLS)



FRONT WALL LOWER BACKPASS HEADER

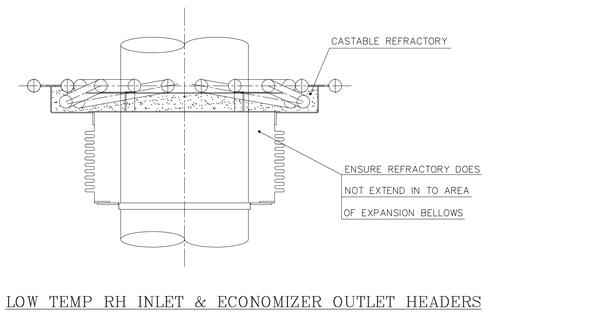


SECTION-CC



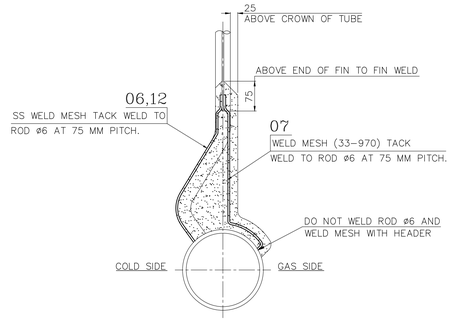
FURNACE REAR ARCH
EXPANSION JOINT

TYP. METHOD OF INSULATING
HEADER PENETRATION THRU WATER WALLS

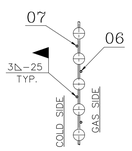


LOW TEMP RH INLET & ECONOMIZER OUTLET HEADERS

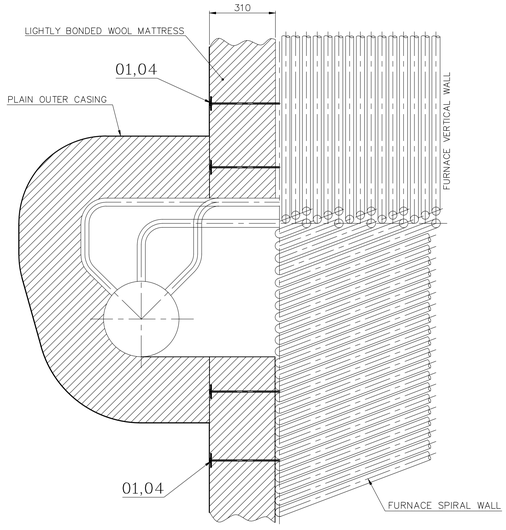
SECTION-CC



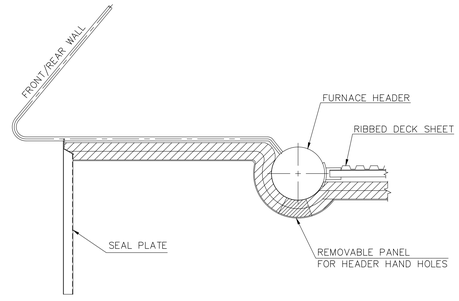
SECTION-DD



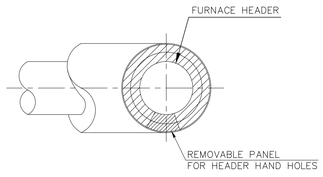
TYPICAL STAGGERED WELD
PATTERN OF RODS TO FINS



FURNACE INTERIM HEADER



FRONT/REAR WALL BOTTOM HEADER



SIDE WALL BOTTOM HEADER

LEGEND:

- CASTABLE REFRACTORY TYPE-A
- LIGHTLY BONDED WOOL MATTRESS
- CERAMIC WOOL FIBER

FOR DOOR ERECTION DETAILS
REFER DRG. NOS.

0-00-205-20969
0-00-205-20970
0-00-205-20971
0-00-205-20973
0-00-205-20974

FOR TENDER PUPOSE ONLY

REV.	DATE	ALTD :
01.		CHD&APPD:
ZONE		

CUSTOMER Nos.: 1700, 1701

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CUSTOMER: NTPC LIMITED

PROJECT: BARH SUPER THERMAL POWER PROJECT
STAGE-II (2x660MW) - UNIT NO 4&5
STEAM GENERATOR PACKAGE

BHARAT HEAVY ELECTRICALS LIMITED.,
BOILER PLANT UNIT; TIRUCHIRAPALLI-620014

	NAME		DATE
DRN	C.S.RAJ		20.02.12
CHD	C.G.S		22.02.12
APPD	C.G.S		24.02.12

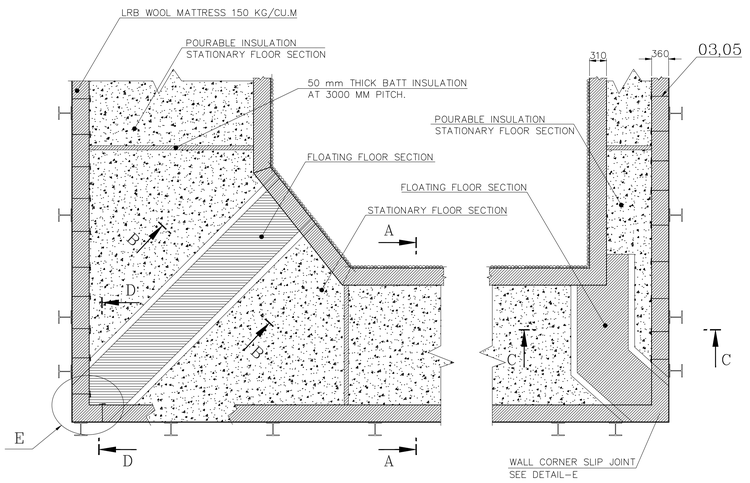
TITLE: FURNACE HEADERS
INSUL & REF ARRANGEMENT
SHEET 04 OF 06

ALL DIMENSIONS IN MILLIMETRE | PROJECTION | SCALE N T S | DRG.NO. 0-00-205-20972 | REV. 00

E-TENDER ENQUIRY NO.: PSER:PUR:BRH-S434:20 (ENQ:20:PP:0015:PUR:88) Date 05/03/2021.

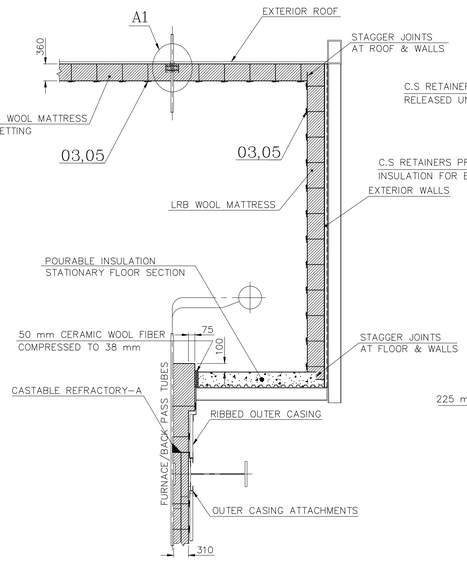
DRAWING NO: 0-00-205-20973

ALL DIMENSIONS ARE IN MM
FOR TOLERANCES OF UNTOLERANCED DIMENSIONS DURING MANUFACTURE REFER RELEVANT QCP / QP

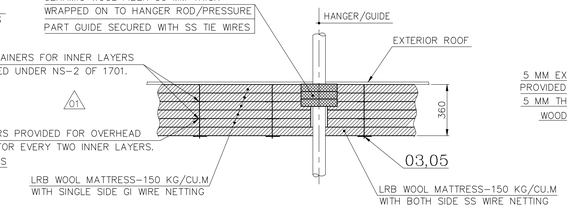


ENCLOSURE PLAN VIEW

PERIMETER FLOOR / CORNERS

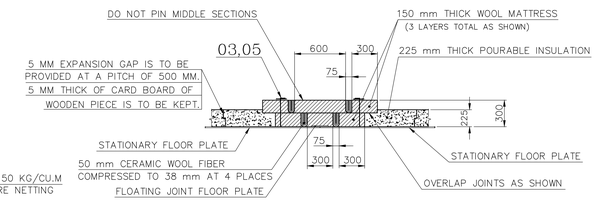


SECTION-AA

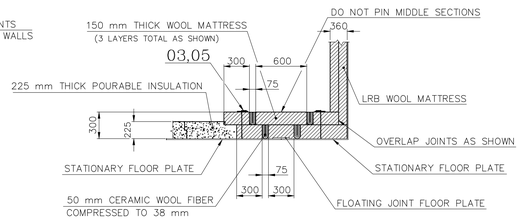


DETAIL-A1

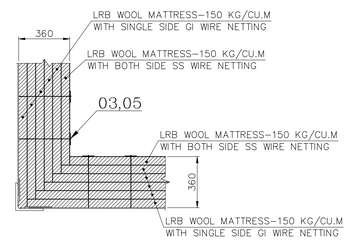
TYPICAL THROUGH ROOF OF ROOF ENCLOSURE



SECTION-BB



SECTION-CC



DETAIL-E

LTRH OUTLET

FINISH RH, INLET AND OUTLET

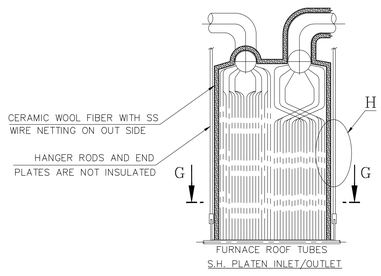
SECTIONS THRU REHEATER ELEMENTS & HEADERS

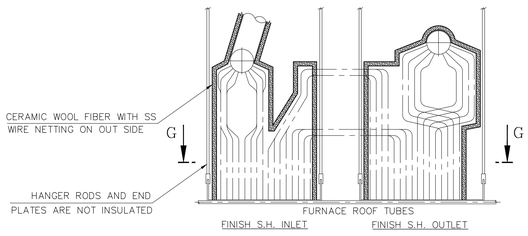
SECTION-F1F1

BUCKSTAY LINK THROUGH SIDE WALL

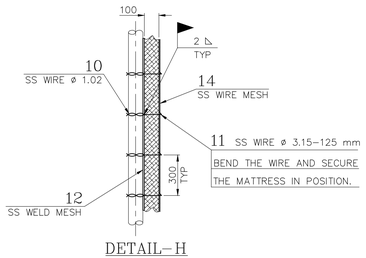
FIXING DETAIL OF INSULATION ON ROOF ENCL CORRUGATED SHEETS

SECTION-FF



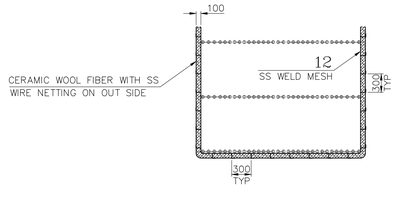


SECTIONS THRU SUPER HEATER ELEMENTS & HEADERS



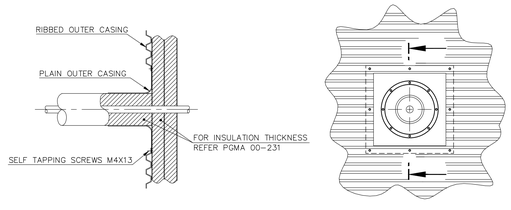
DETAIL-H

TYPICAL



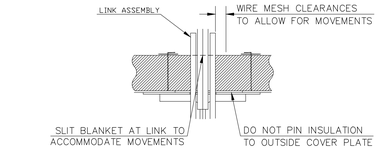
SECTION-GG

TYPICAL

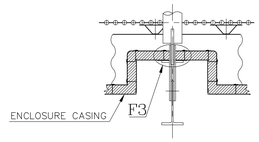


ENCLOSURE WALL PIPE SEAL

TYPICAL FURNACE & BACKPASS ROOF ENCLOSURE



DETAIL-F3



SECTION-F2F2

FOR TENDER PUPOSE ONLY

FOR DOOR ERECTION DETAILS
FOREFER DRG. NOS.

0-00-205-20969
0-00-205-20970
0-00-205-20971
0-00-205-20972
0-00-205-20974

LEGEND:

- CASTABLE REFRACTORY TYPE-A
- LIGHTLY BONDED WOOL MATTRESS
- CERAMIC WOOL FIBRE

REV.	DATE	ALTD :	PRASANTH.J
01.	16.12.13	CHD&APPD:	SELVAM.K

ZONE: ADDED NOTES IN DETAIL A1.

CUSTOMER Nos.: 1700, 1701

CUSTOMER: NTPC LIMITED

PROJECT: BARH SUPER THERMAL POWER PROJECT
STAGE-II (2x660MW) - UNIT NO 4&5
STEAM GENERATOR PACKAGE

BHARAT HEAVY ELECTRICALS LIMITED.,
BOILER PLANT UNIT; TIRUCHIRAPALLI-620014

	NAME	DATE
DRN	C.S.RAJ	20.02.12
CHD	C.G.S	22.02.12
APPD	C.G.S	24.02.12

TITLE: PENT HOUSE
INSUL & REF ARRANGEMENT
SHEET 05 OF 06

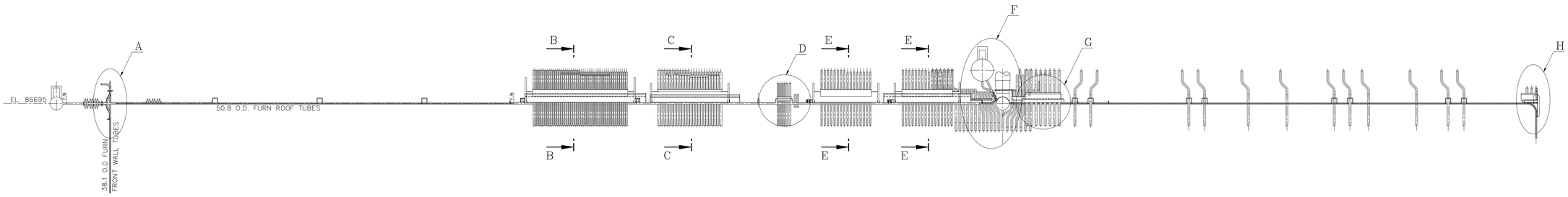
ALL DIMENSIONS IN MILLIMETRE | PROJECTION | SCALE N T S | DRG.NO. 0-00-205-20973 | REV. 01

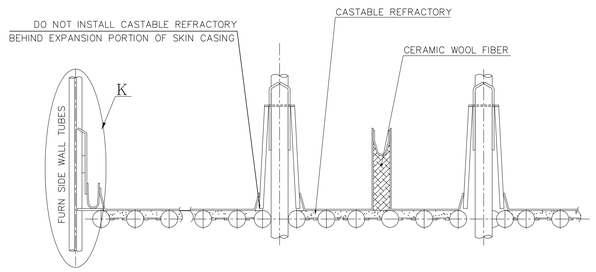
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E-TENDER ENQUIRY NO.: PSER:PUR:BRH-S434:20 (ENQ:20:PP:0015:PUR:88) Date 05/03/2021.

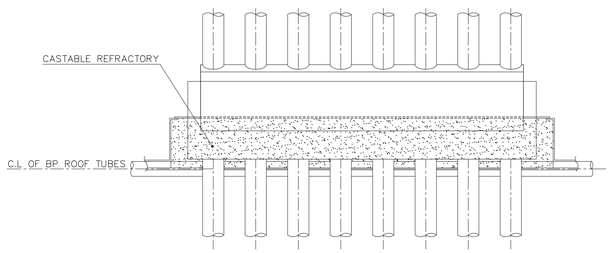
DRAWING NO: 0-00-205-20974

ALL DIMENSIONS ARE IN MM
FOR TOLERANCES OF UNTOLERANCED DIMENSIONS DURING MANUFACTURE REFER RELEVANT QCP / QP

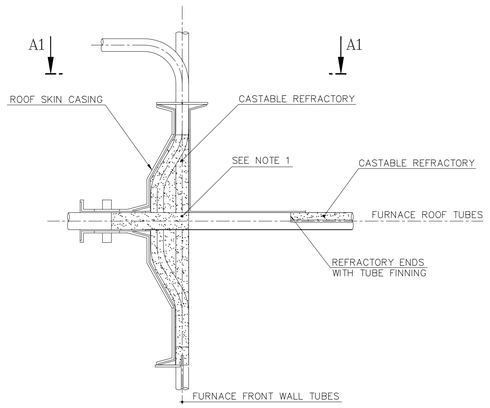




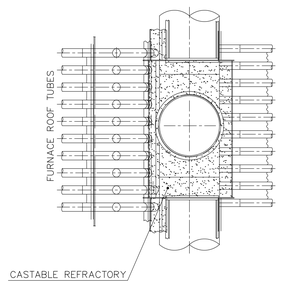
SECTION–BB
SH PLATEN ASSEMBLY



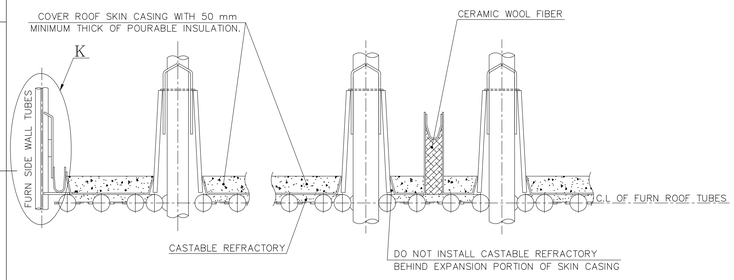
DETAIL–G
LTRH PLATEN ASSEMBLY



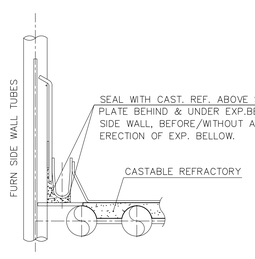
DETAIL–A
ROOF TUBES/FRONT WALL



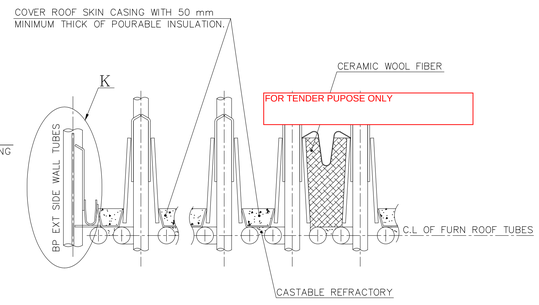
SECTION–F3F3



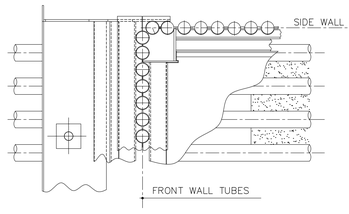
SECTION–CC
FINISHING RH ASSEMBLY



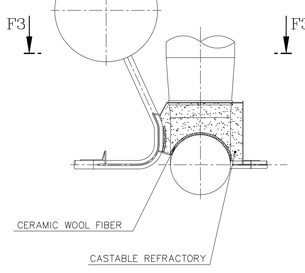
DETAIL–K 01



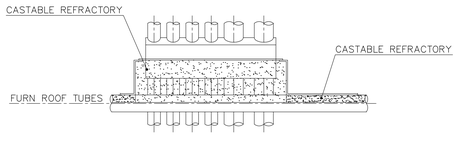
SECTION–EE
FINISHING SH ASSEMBLY



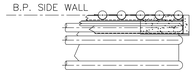
SECTION–A1A1



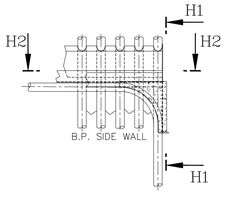
DETAIL–F2
BACK PASS UPPER FRONT HEADER



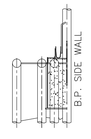
DETAIL–D
FURNACE REAR OUTLET HEADER



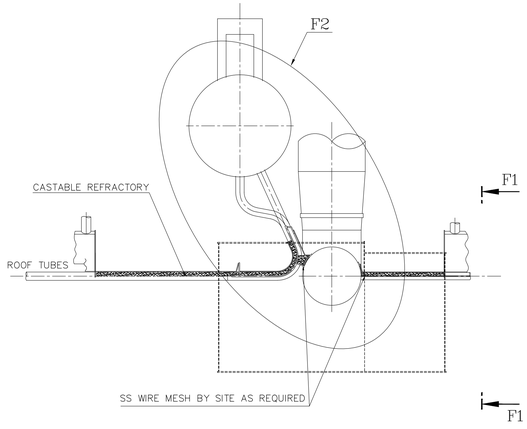
SECTION–H2H2



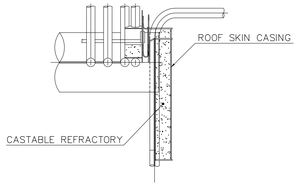
DETAIL–H
BACKPASS REAR WALL CORNER BOX
(APPLICABLE BOTH SIDES)



SECTION–H1H1



DETAIL–F
BACK PASS UPPER FRONT HEADER



SECTION–F1F1

LEGEND:

- CASTABLE REFRACTORY TYPE–A
- POURABLE INSULATION
- LIGHTLY BONDED WOOL MATTRESS
- CERAMIC WOOL FIBER

FOR DOOR ERECTION DETAILS REFER DRG. NOS.

0–00–205–20969
0–00–205–20970
0–00–205–20971
0–00–205–20972
0–00–205–20973

NOTES: –

1. PAINT ALL THE TUBES WHICH ARE EMBEDED IN CASTABLE REFRACTORY WITH A 1.5 MM THICK COAT OF BLACK BITUMASTIC PAINT.
2. CASTABLE REFRACTORY IS TO BE APPLIED AS PER THE DETAILS SHOWN IN THIS DRG. BEFORE THE SKIN IS INSTALLED.
3. IN PLACE OF MASS APPLICATION OF CASTABLE REFRACTORY 1mm THICK CARD BOARD IS TO BE PROVIDED AT A PITCH OF ~600mm FOR EXPANSION.
4. KEEP CASTABLE REFRACTORY FLUSH WITH OUTSIDE EDGE OF TUBES EXCEPT WHERE OTHERWISE NOTED.
5. FOR APPLICATION AND CURING OF CASTABLE REFRACTORY AND POURABLE INSULATION REFER DRG. NOS. 4–00–205–08525 TO 4–00–205–08529.
6. FOR ROOF SKIN CASING REFER DRGS. ISSUED UNDER PGMA'S 18–001.

REV.	DATE	ALTD	S.VIVEK
01.	23.01.2017	CHD&APPD:	K.SELVAM
ZONE	DETAIL –K ADDED		

CUSTOMER Nos.: 1700, 1701

CUSTOMER: NTPC LIMITED

PROJECT: BARH SUPER THERMAL POWER PROJECT
STAGE–II (2x660MW) – UNIT NO 4&5
STEAM GENERATOR PACKAGE

BHARAT HEAVY ELECTRICALS LIMITED.,
BOILER PLANT UNIT; TIRUCHIRAPALLI–620014

	NAME	DATE
DRN	C.S.RAJ	20.02.12
CHD	C.G.S	22.02.12
APPD	C.G.S	24.02.12

TITLE: FURNACE ROOF INSUL & REF ARRANGEMENT
SHEET 06 OF 06

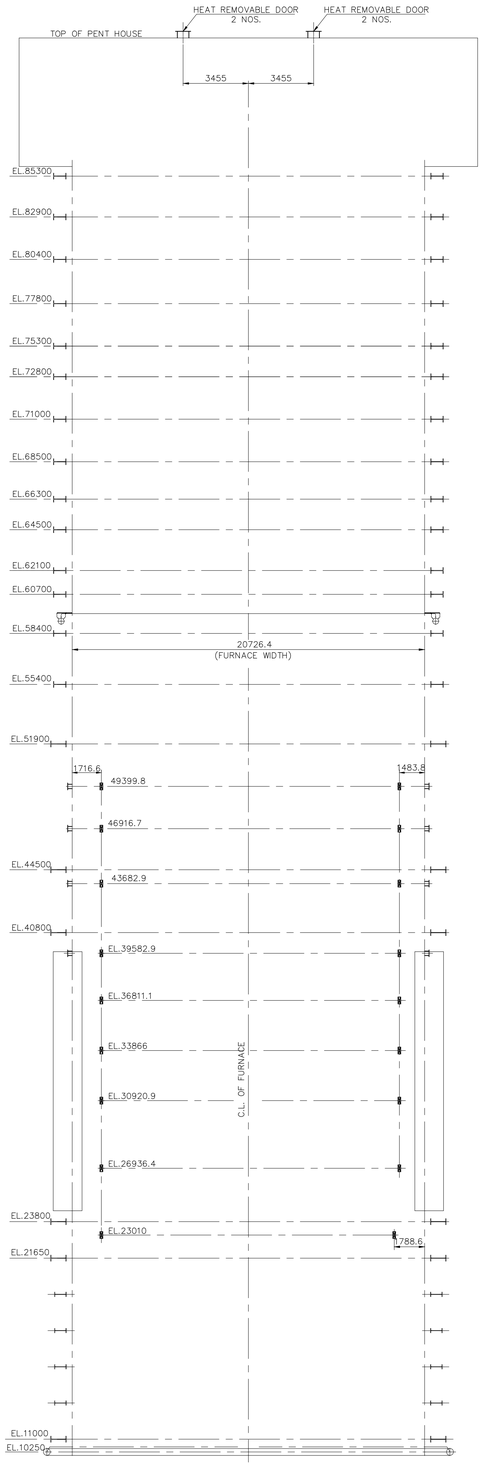
ALL DIMENSIONS IN MILLIMETRE | PROJECTION | SCALE N T S | DRG.NO. 0–00–205–20974 | REV. 01

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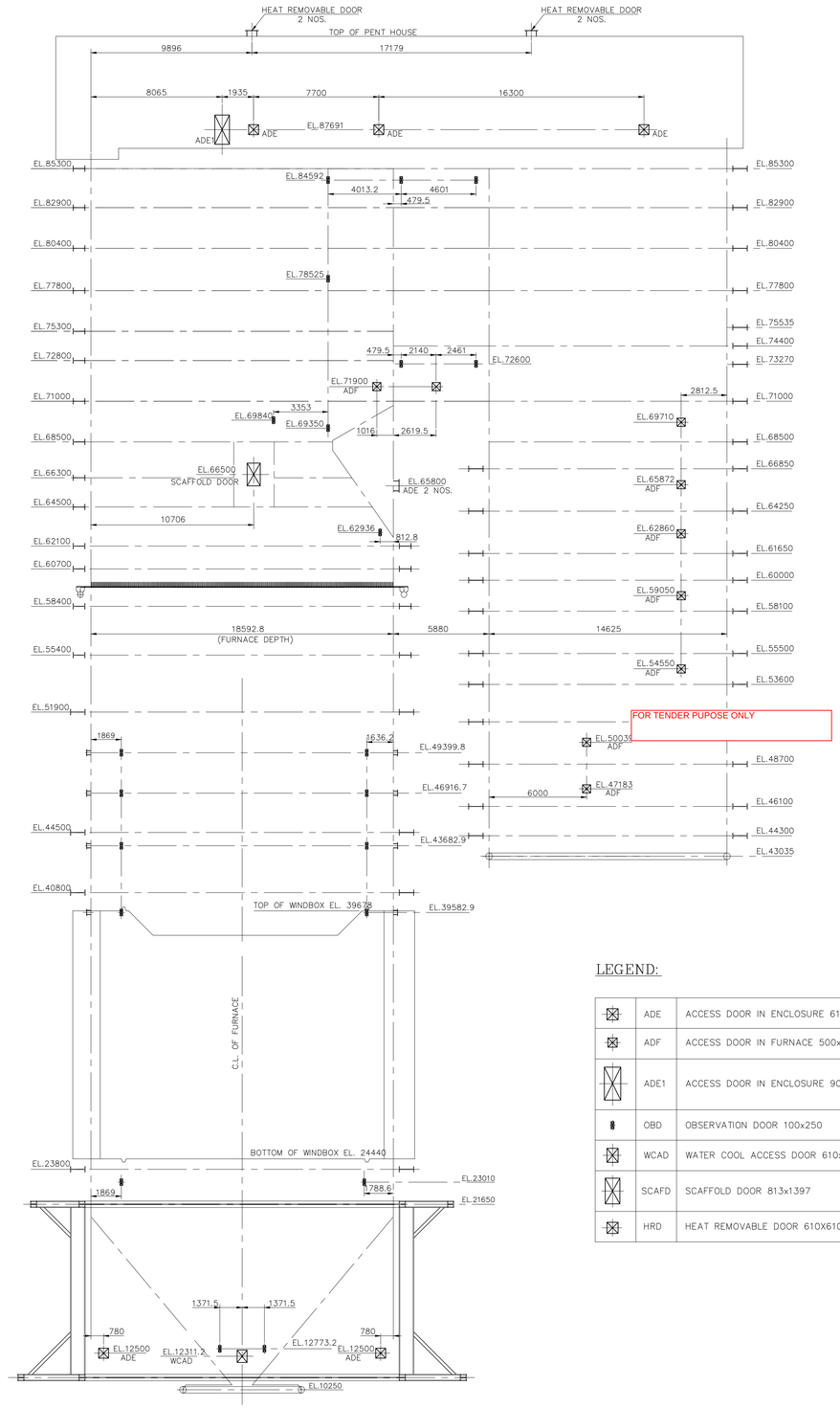
E-TENDER ENQUIRY NO.: PSER:PUR:BRH-S434:20 (ENQ:20:PP:0015:PUR:88) Date 05/03/2021.

DRAWING NO: 0-00-230-21854

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



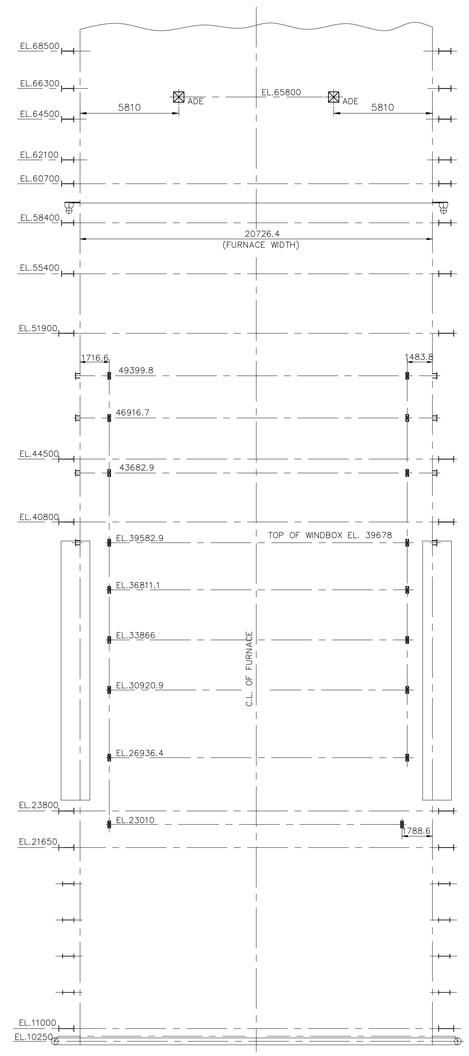
FURNACE FRONT ELEVATION



FURNACE RIGHT SIDE ELEVATION

LEGEND:

	ADE	ACCESS DOOR IN ENCLOSURE 610x610	12
	ADF	ACCESS DOOR IN FURNACE 500x500	18
	ADE1	ACCESS DOOR IN ENCLOSURE 900x1800	02
	OBD	OBSERVATION DOOR 100x250	78
	WCAD	WATER COOL ACCESS DOOR 610x762	02
	SCAFD	SCAFFOLD DOOR 813x1397	02
	HRD	HEAT REMOVABLE DOOR 610X610	04



FURNACE REAR ELEVATION

NOTE:

01. FOR DOOR ERECTION DETAILS REFER DRG. NOS.
1-00-230-06921
1-00-230-06922
1-00-230-06923
1-00-230-06924
0-00-230-21855
0-00-230-21856
0-00-230-21857

CUSTOMER Nos.: 1700, 1701

CUSTOMER: NTPC LIMITED

PROJECT: BARH SUPER THERMAL POWER PROJECT
STAGE-II (2x660MW) - UNIT NO 4&5
STEAM GENERATOR PACKAGE

BHARAT HEAVY ELECTRICALS LIMITED.,
BOILER PLANT UNIT; TIRUCHIRAPALLI-620014

	NAME	DATE
DRN	C.S.RAJ	19.12.11
CHD	C.G.S.	20.12.11
APPD	C.G.S.	22.12.11

TITLE: LOCATION OF FURNACE DOORS

ALL DIMENSIONS IN MILLIMETRE | DRG.NO. 0-00-230-21854 | REV. 00

PROJECTION | SCALE 1:125

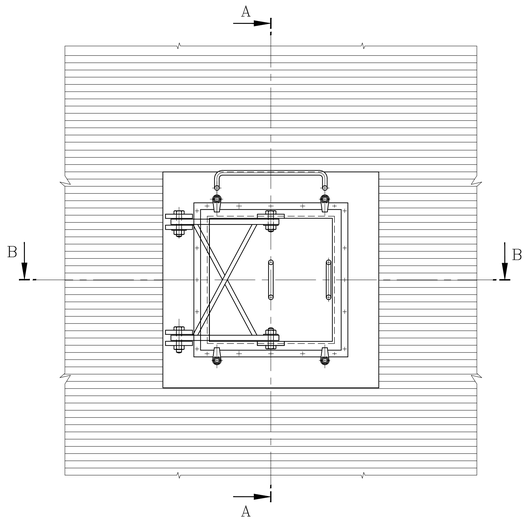
REV.	DATE	ALTD :
01.		CHD&APPD:
ZONE		

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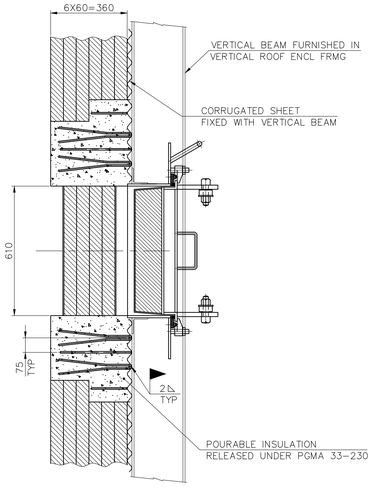
E-TENDER ENQUIRY NO.: PSER:PUR:BRH-S434:20 (ENQ:20:PP:0015:PUR:88) Date 05/03/2021.

DRAWING NO. 0-00-230-21855

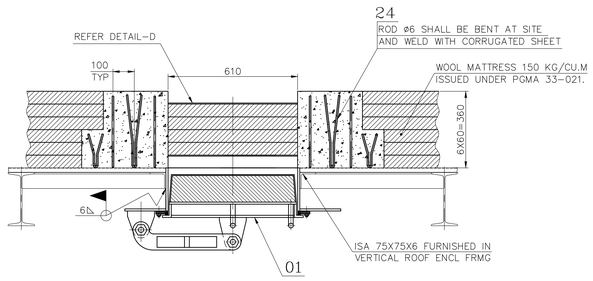
FOR TOLERANCES OF UNTOLERANCED DIMENSIONS DURING MANUFACTURE REFER PLANT STD. NO TP 023 0299



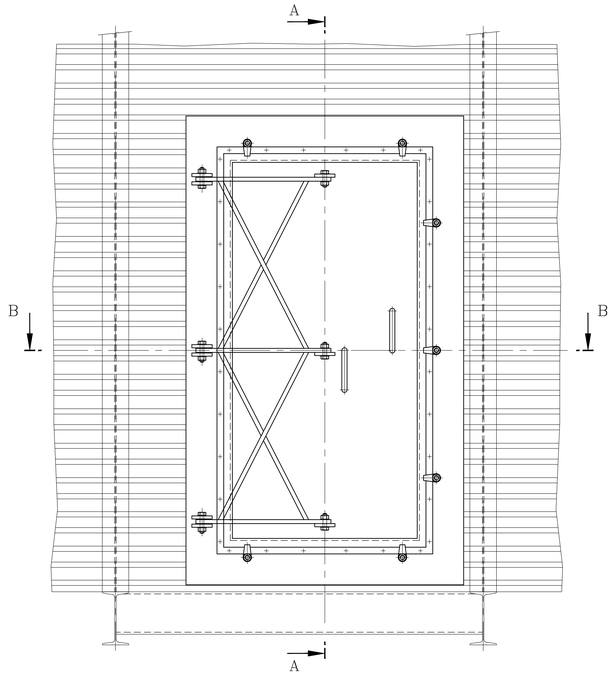
ACCESS DOOR 610X610
IN VERTICAL ROOF ENCLOSURE



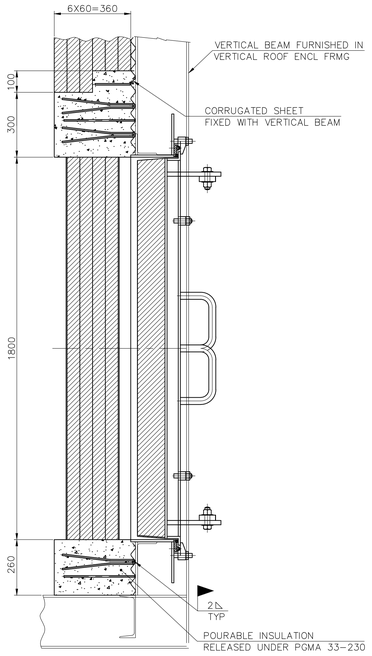
SECTION-AA



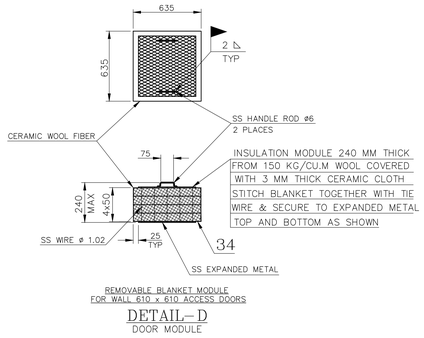
SECTION-BB



ACCESS DOOR IN ROOF ENCLOSURE
(900 X 1800)

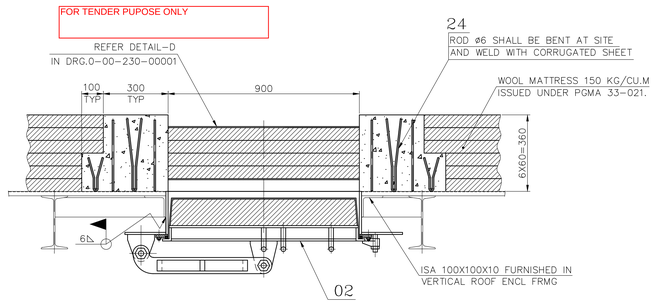


SECTION-AA

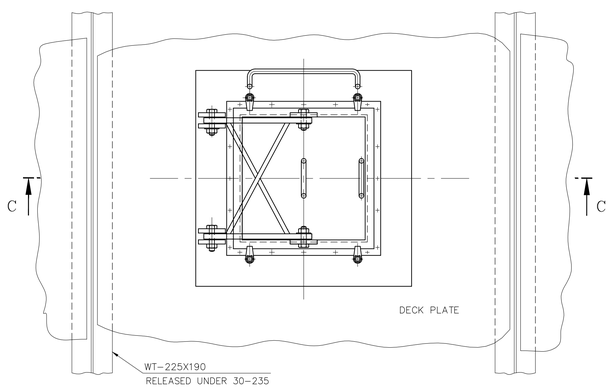


DETAIL-D
DOOR MODULE

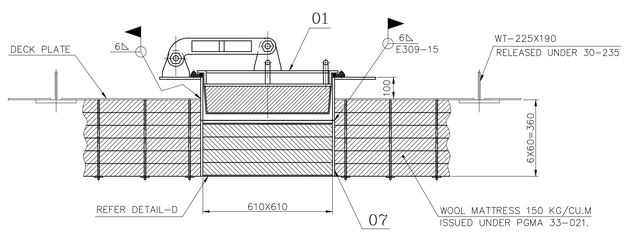
FOR TENDER PUPOSE ONLY



SECTION-BB



HEAT REMOVABLE DOOR 610X610
IN VERTICAL ROOF ENCLOSURE DECK



SECTION-CC

NOTES:

01. MATERIALS ARE RELEASED UNDER PGMA 28-220.
02. INSULATION AND LINING MATERIALS ARE RELEASED UNDER PG 33.
03. NECESSARY CUTTING,BENDING,FABRICATION,ETC. MAY BE DONE AT SITE ACCORDING TO SITE CONDITIONS AND REQUIREMENTS.
04. FOR LOCATION OF DOORS REFER DRG. NO. 0-00-230-21854

WELDING TABLE

S.L. NO.	TYPE AND SIZE OF WELD	WELDING ELECTRODE SPECIFICATION	LENGTH OF WELDED IN RM.	MATERIAL / PART TO BE WELEDED
01	6	E 7018	22	CS + CS
02	6	E 309-15	10	CS + SS
03	2	E 7018	4	CS + CS

REV.	DATE	ALTD :
01.		CHD&APPD:
ZONE		

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CUSTOMER Nos.: 1700, 1701

CUSTOMER: NTPC LIMITED

PROJECT: BARH SUPER THERMAL POWER PROJECT
STAGE-II (2x660MW) - UNIT NO 4&5
STEAM GENERATOR PACKAGE

BHARAT HEAVY ELECTRICALS LIMITED.,
BOILER PLANT UNIT; TIRUCHIRAPALLI-620014

	NAME	DATE
DRN	C.S.RAJ	19.12.11
CHD	C.G.S	20.12.11
APPD	C.G.S	22.12.11

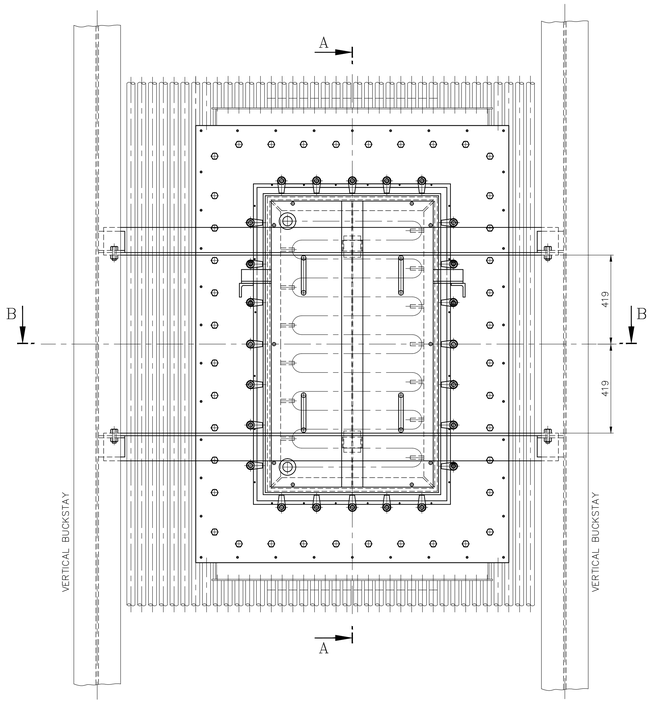
TITLE: FIXING DETAILS OF ACCESS DOORS IN ROOF ENCLOSURE

ALL DIMENSIONS IN MILLIMETRE | PROJECTION | SCALE N T S | DRG.NO. 0-00-230-21855 | REV.

E-TENDER ENQUIRY NO.: PSER:PUR:BRH-S434:20 (ENQ:20:PP:0015:PUR:88) Date 05/03/2021.

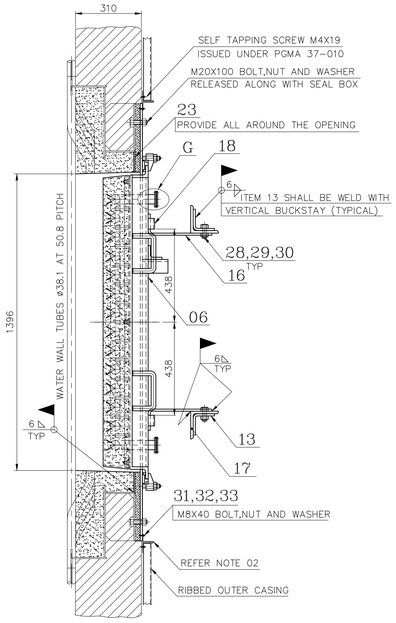
DRAWING NO: 0-00-230-21856

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

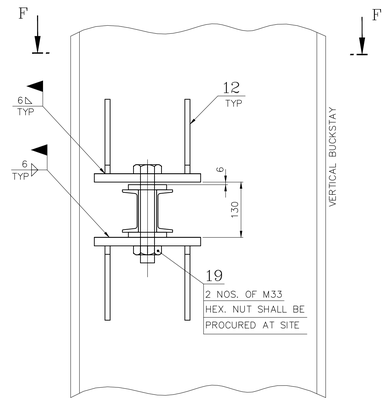


SCAFFOLD DOOR 800X1385 ELEVATION

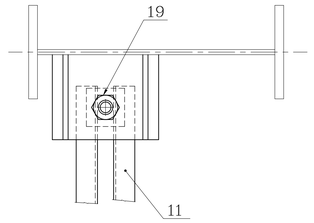
WITHOUT INSULATION DETAILS



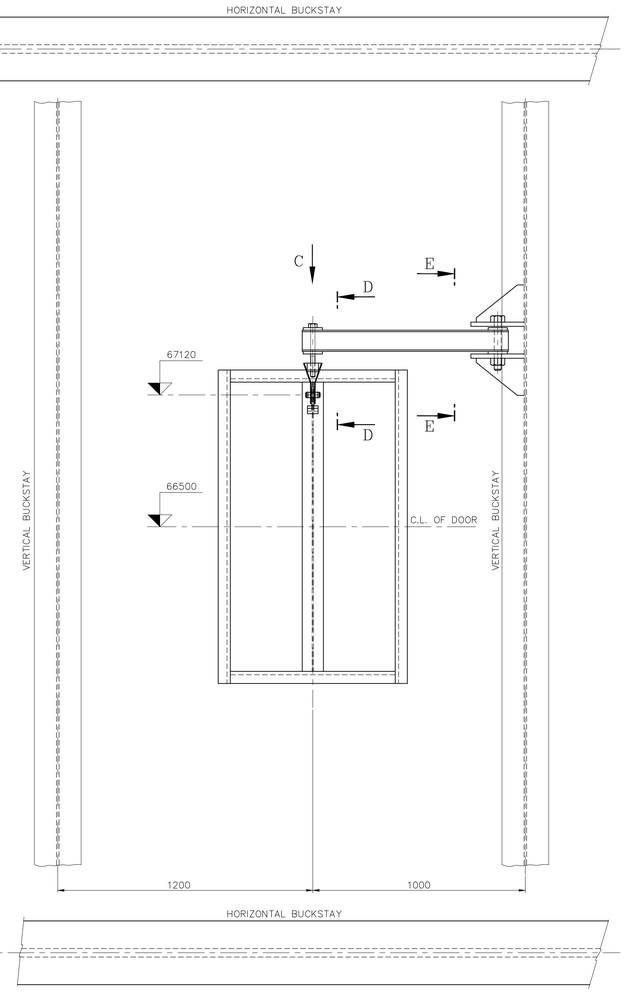
SECTION-AA



SECTION-EE

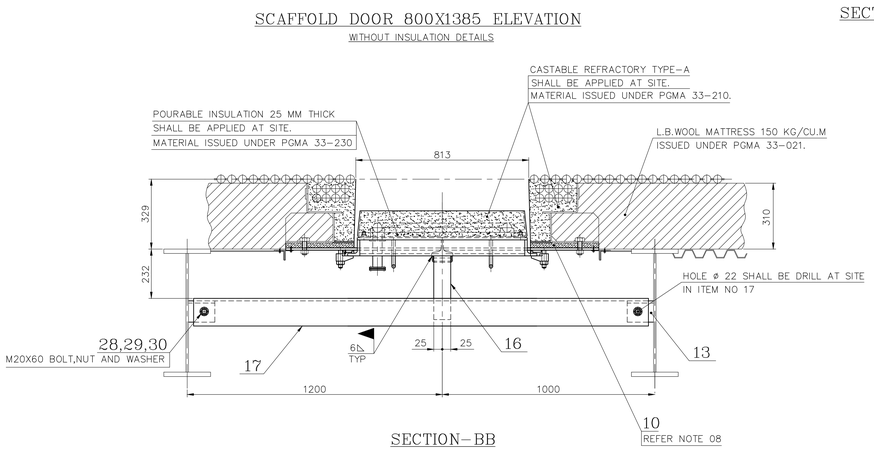


FOR TENDER PUPOSE ONLY

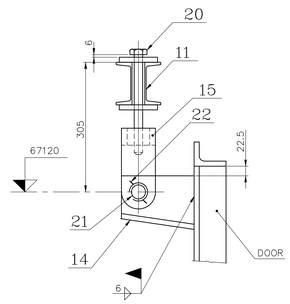


HOLDINDING ARRANGEMENT DOOR

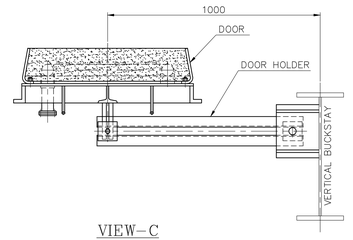
RIGHT SIDE ELEVATION



SECTION-BB



SECTION-DD



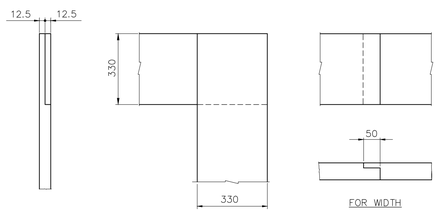
VIEW-C

NOTES: -

01. MATERIAL ISSUED UNDER PGMA 28-220.
02. TO BE FABRICATED AT SITE BY MAKING USE OF PLAIN ALU. SHEET RELEASED UNDER PGMA 37-810.
03. SCAFFOLD DOOR REQUIRES COOLING WATER OF 1800 KG/HOUR.
04. COOLING WATER PRESSURE 2 KG/CM.^{2}
05 PRSSURE DROP OF COOLING WATER 0.12 KG/CM.^{2}
06. TEMPERATURE RISE OF COOLING WATER 28°C.
07. THE INLET AND OUTLET TUBES OF SCAFFOLD DOOR HAS TO BE CONNECTED WITH THE INLET AND OUTLET COOLING WATER SUPPLY LINES BY MEANS OF FLEXIBLE HOUSE. USE DU.NO:027 OF PGMA 28-220.
08. MILL BOARDS (DU 010) ARE TO BE LAID SUITABLY AT SITE TO THE SHAPE OF THE RESPECTIVE MOUNTING PLATE.
09. FOR LOCATION OF DOORS REFER DRG. NO. 0-00-230-21854.

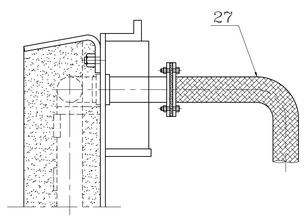
WELDING TABLE

S.L. NO.	TYPE AND SIZE OF WELD	WELDING ELECTRODE SPECIFICATION	LENGTH OF WELDED IN RM.	MATERIAL / PART TO BE WELEDED
01	6◺	E 7018	10	CS + CS



TYPICAL FIXING DETAIL OF MILL BOARD

TO BE LAMINATED WITH FEVICOL SEE NOTE 08



DETAIL-G

CUSTOMER Nos.: 1700, 1701

CUSTOMER: NTPC LIMITED

PROJECT: BARH SUPER THERMAL POWER PROJECT
STAGE-II (2x660MW) - UNIT NO 4&5
STEAM GENERATOR PACKAGE

BHARAT HEAVY ELECTRICALS LIMITED.,
BOILER PLANT UNIT; TIRUCHIRAPALLI-620014

	NAME	DATE
DRN	C.S.RAJ	19.12.11
CHD	C.G.S	20.12.11
APPD	C.G.S	22.12.11

TITLE: FIXING DETAILS OF SCAFFOLD DOOR

ALL DIMENSIONS IN MILLIMETRE
PROJECTION
SCALE N T S

DRG.NO. 0-00-230-21856

REV.

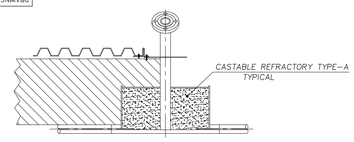
REV. 01:	DATE	ALTD :
ZONE		CHD&APPD:

CAUTION: THE INFORMATION ON THIS DOCUMENT IS THE PROPERTY OF BHARAT HEAVY ELECTRICALS LIMITED.IT MUST NOT BE USED DIRECT OR INDIRECTLY IN ANY WAY DETRIMENTAL TO THE INTEREST OF THE COMPANY.

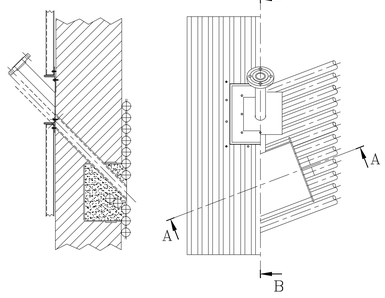
E-TENDER ENQUIRY NO.: PSER:PUR:BRH-S434:20 (ENQ:20:PP:0015:PUR:88) Date 05/03/2021.

DRAWING NO. 0-00-230-21857

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

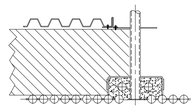


SECTION-AA

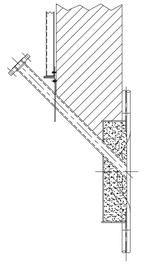


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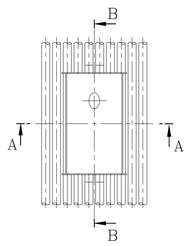
ASLD OPENING
LOWER FURNACE



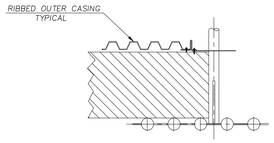
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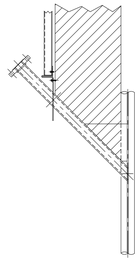
SECTION-BB



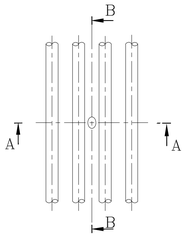
ASLD1 OPENING
UPPER FURNACE



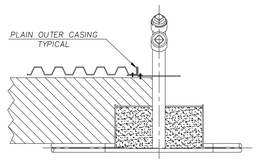
SECTION-AA



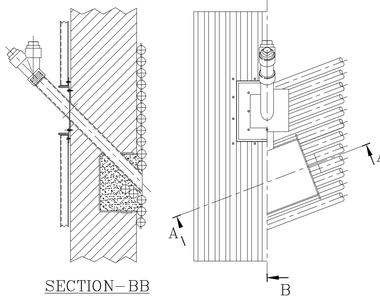
SECTION-BB



ASLD3 OPENING
BACK PASS

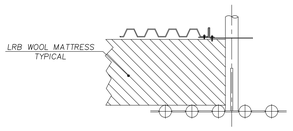


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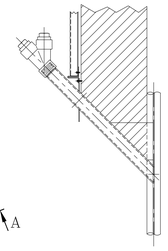


SECTION-BB

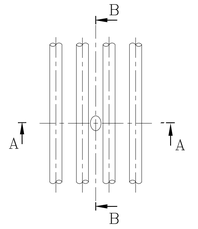
INSTRUMENT INSERT OPENING
LOWER FURNACE



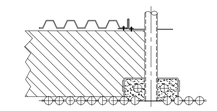
SECTION-AA



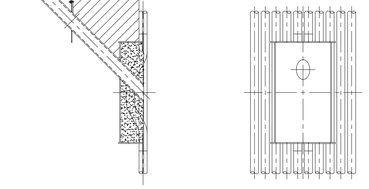
SECTION-BB



INSTRUMENT INSERT OPENING
BACK PASS

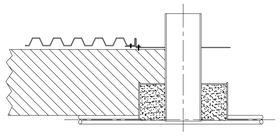


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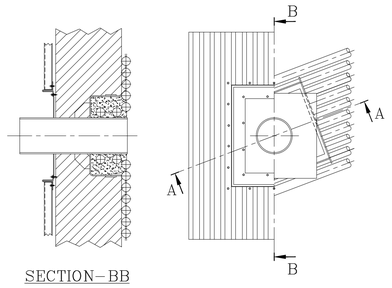


SECTION-BB

INSTRUMENT INSERT OPENING
UPPER FURNACE

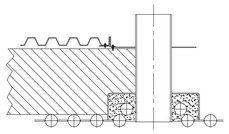


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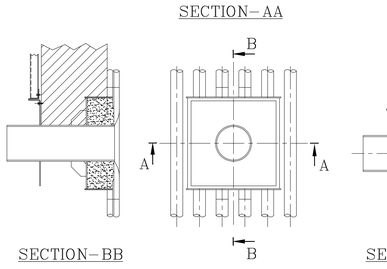


SECTION-BB

ACOUSTIC PYROMETER OPENING
LOWER FURNACE

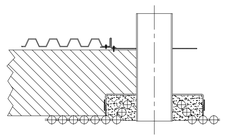


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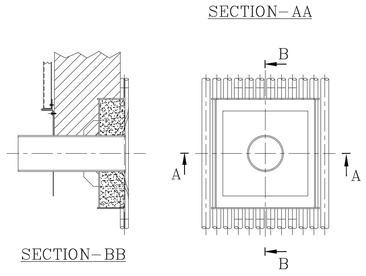


SECTION-BB

ACOUSTIC PYROMETER OPENING
EXTENDED PASS

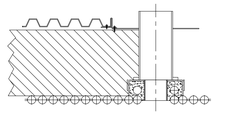


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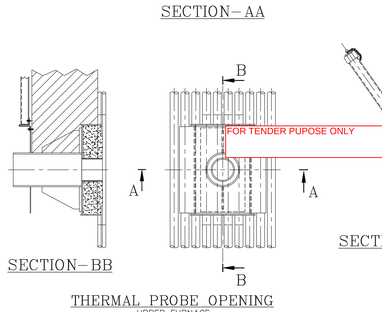


SECTION-BB

ACOUSTIC PYROMETER OPENING
UPPER FURNACE

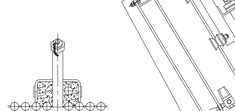


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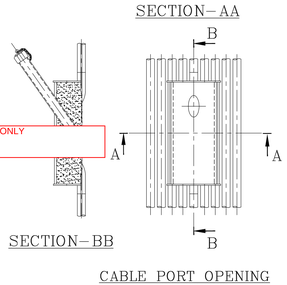


SECTION-BB

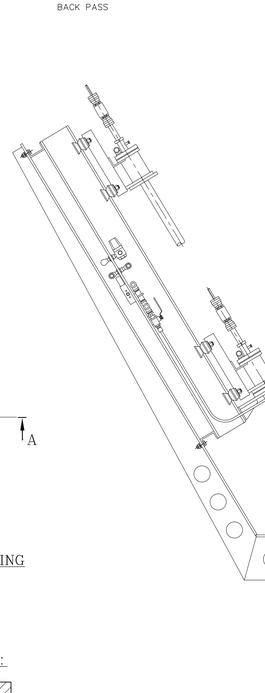
THERMAL PROBE OPENING
UPPER FURNACE



SECTION-AA



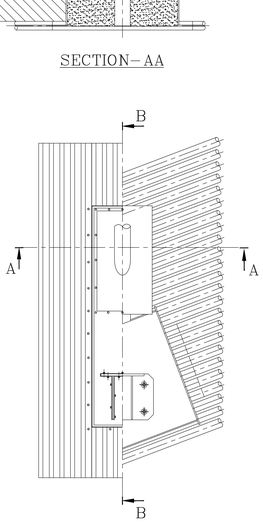
CABLE PORT OPENING
EXTENDED PASS



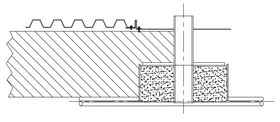
SECTION-BB



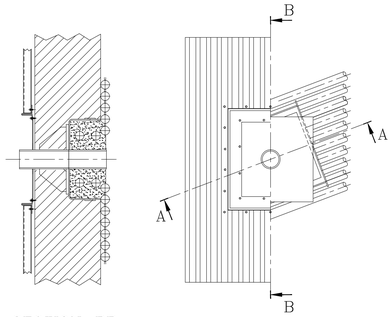
SECTION-AA



TELEVISION CAMERA OPENING
LOWER FURNACE

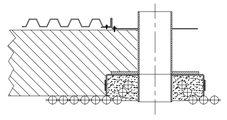


SECTION-AA

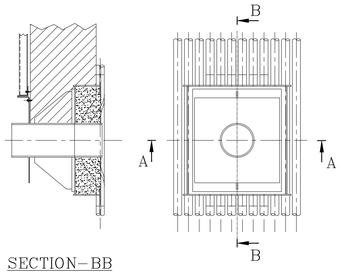


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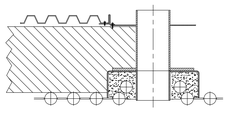
WALL BLOWER OPENING
LOWER FURNACE



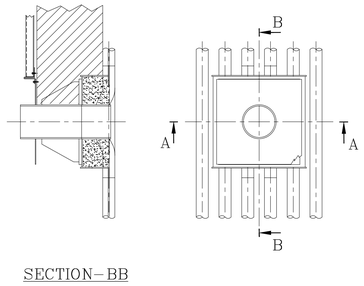
SECTION-AA



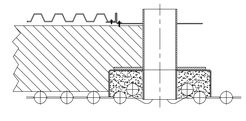
SOOT BLOWER OPENING
UPPER FURNACE



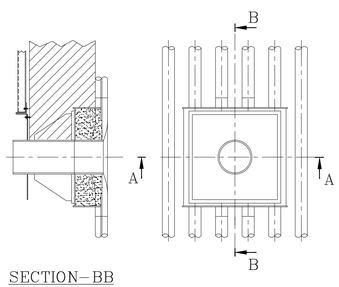
SECTION-AA



SOOT BLOWER OPENING
EXTENDED PASS



SECTION-AA



SOOT BLOWER OPENING
BACK PASS

LEGEND:

--- LIGHTLY BONDED WOOL MATRESSES

--- CSATABLE REFRACTORY TYPE – A

NOTES:

01. FOR LOCATION OF INSTRUMENT TAPPINGS REFER PGMA 09-002.
02. WOOL MATERIALS ARE RELEASED UNDER PGMA 33-021.
03. REFRACTORY MATERIAL IS RELEASED UNDER PGMA 33-210.
04. OUTER CASING MATERIALS ARE RELEASED UNDER PGMA 37-810.
05. PAINT THE SURFACE OF TUBES WHICH ARE EMBEDED IN CASTABLE REFRACTORY WITH A THICK COAT OF BLACK BITUMINUOUS PAINT (IS:158).
06. FILL THE FUTURE OPENNING WITH CERAMIC WOOL FIBRES.
07. FOR LOCATION OF DOORS REFER DRG. NO. 0-00-230-21854

CUSTOMER Nos.: 1700, 1701

REV.	DATE	ALTD :
01.		CHD&APPD:
ZONE		

CAUTION: THE INFORMATION ON THIS DOCUMENT IS THE PROPERTY OF BHARAT HEAVY ELECTRICALS LIMITED.IT MUST NOT BE USED DIRECTLY OR INDIRECTLY IN ANY WAY DETRIMENTAL TO THE INTERESTS OF THE COMPANY.

CUSTOMER: NTPC LIMITED

PROJECT: BARH SUPER THERMAL POWER PROJECT
STAGE-II (2x660MW) – UNIT NO 4&5
STEAM GENERATOR PACKAGE

BHARAT HEAVY ELECTRICALS LIMITED.,
BOILER PLANT UNIT; TIRUCHIRAPALLI-620014

	NAME	DATE
DRN	C.S.RAJ	19.12.11
CHD	C.G.S	20.12.11
APPD	C.G.S	22.12.11

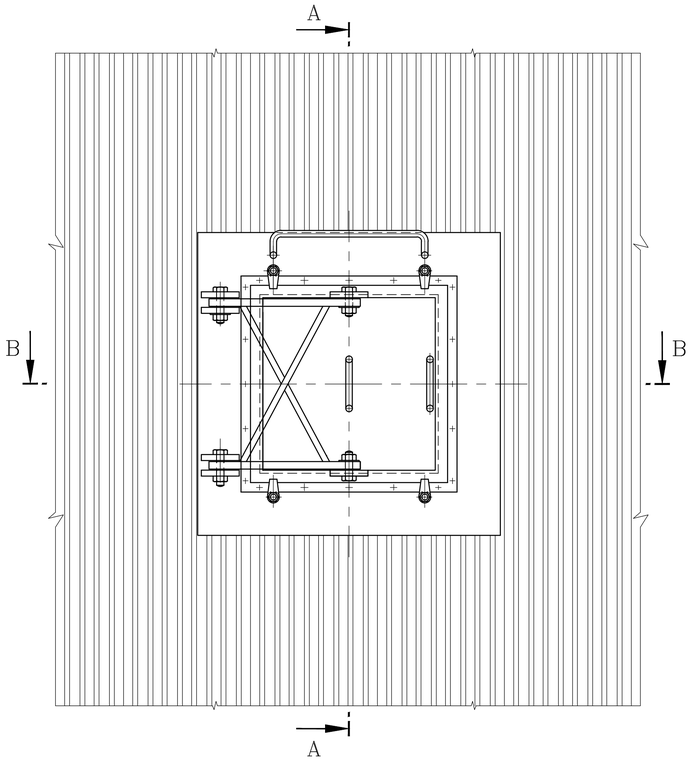
TITLE: REFRACTORY ARRANGEMENT FOR INSTRUMENT TAPPINGS

ALL DIMENSIONS IN MILLIMETRE | PROJECTION | SCALE N T S | DRG.NO. 0-00-230-21857 | REV.

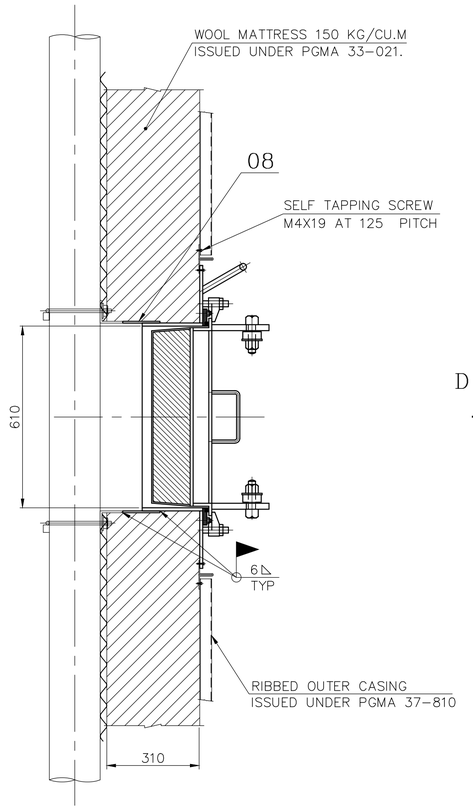
E-TENDER ENQUIRY NO.: PSER:PUR:BRH-S434:20 (ENQ:20:PP:0015:PUR:88) Date 05/03/2021.

DRAWING NO. 1-00-230-06921

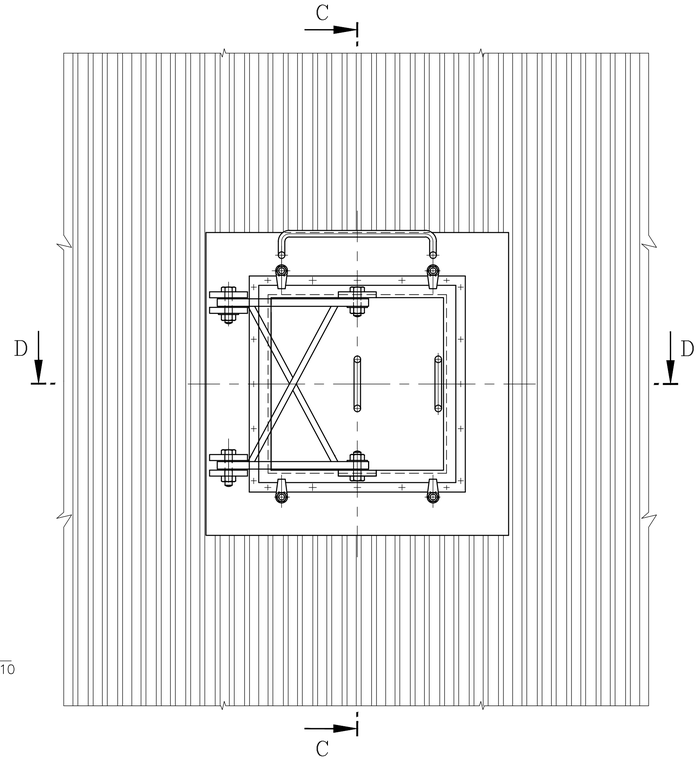
FOR TOLERANCES OF UNTOLERANCED DIMENSIONS DURING MANUFACTURE REFER PLANT STD. NO TP 023 0299



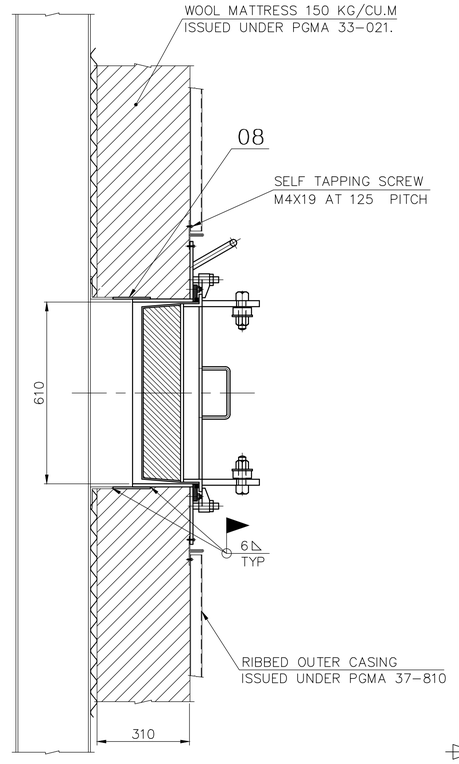
ACCESS DOOR 610X610
IN REAR ARCH ENCLOSURE



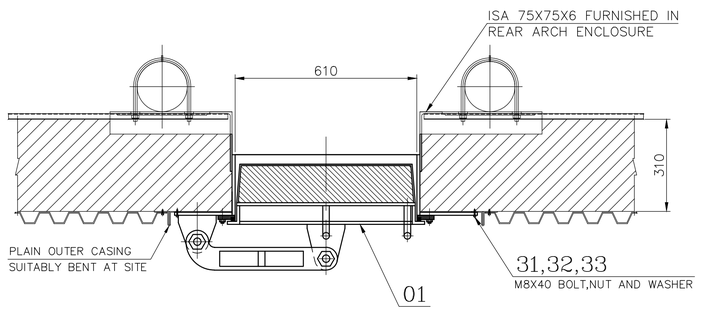
SECTION-AA



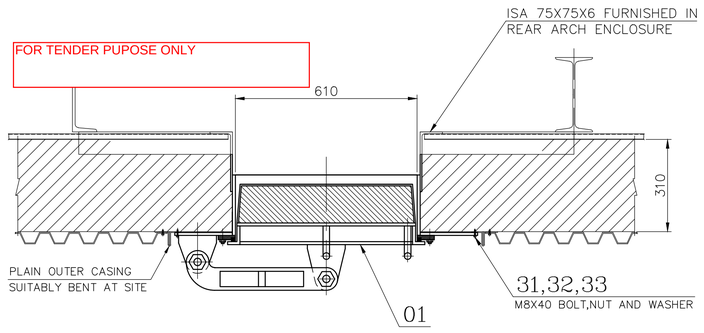
ACCESS DOOR 610X610
IN FURNACE BOTTOM ENCLOSURE



SECTION-CC



SECTION-BB



SECTION-DD

WELDING TABLE

S.L. NO.	TYPE AND SIZE OF WELD	WELDING ELECTRODE SPECIFICATION	LENGTH OF WELDED IN RM.	MATERIAL / PART TO BE WELEDED
01	6◺	E 7018	30	CS + AS

NOTES:

01. MATERIALS ARE RELEASED UNDER PGMA 28-220.
02. INSULATION AND LINING MATERIALS ARE RELEASED UNDER PG 33.
03. NECESSARY CUTTING,BENDING,FABRICATION,ETC. MAY BE DONE AT SITE ACCORDING TO SITE CONDITIONS AND REQUIREMENTS.
04. FOR LOCATION OF DOORS REFER DRG. NO. 0-00-230-21854

REV.	DATE	ALTD :
01.		CHD&APPD:
ZONE		

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CUSTOMER Nos.: 1700, 1701

CUSTOMER: NTPC LIMITED

PROJECT: BARH SUPER THERMAL POWER PROJECT
STAGE-II (2x660MW) - UNIT NO 4&5
STEAM GENERATOR PACKAGE

BHARAT HEAVY ELECTRICALS LIMITED.,
BOILER PLANT UNIT; TIRUCHIRAPALLI-620014

	NAME		DATE
DRN	C.S.RAJ		19.12.11
CHD	C.G.S		20.12.11
APPD	C.G.S		22.12.11

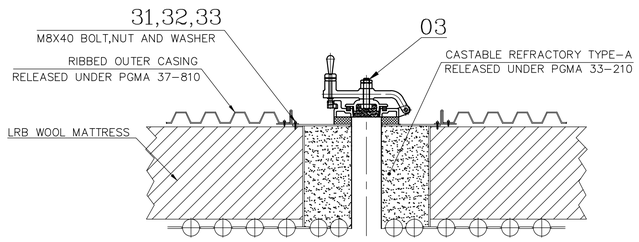
TITLE: FIXING DETAILS OF ACCESS DOOR IN ENCLOSURE

ALL DIMENSIONS IN MILLIMETRE | PROJECTION | SCALE N T S | DRG.NO. 1-00-230-06921 | REV.

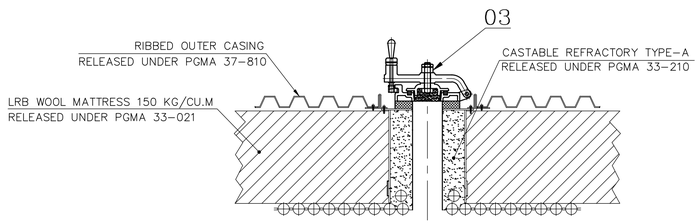
E-TENDER ENQUIRY NO.: PSER:PUR:BRH-S434:20 (ENQ:20:PP:0015:PUR:88) Date 05/03/2021.

DRAWING NO: 1-00-230-06922

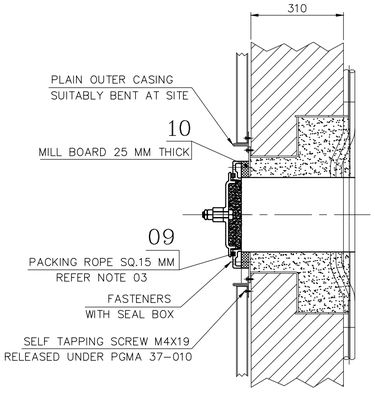
FOR TOLERANCES OF UNTOLERANCED DIMENSIONS DURING MANUFACTURE REFER PLANT STD. NO TP 023 0299



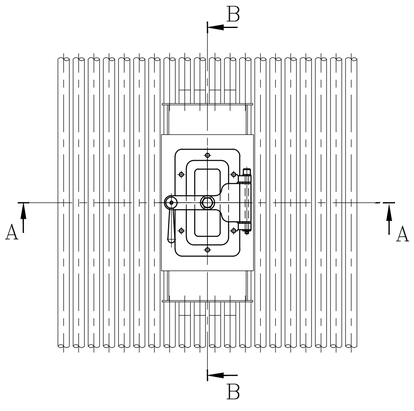
SECTION-AA
(IN EXTENDED FURNACE)



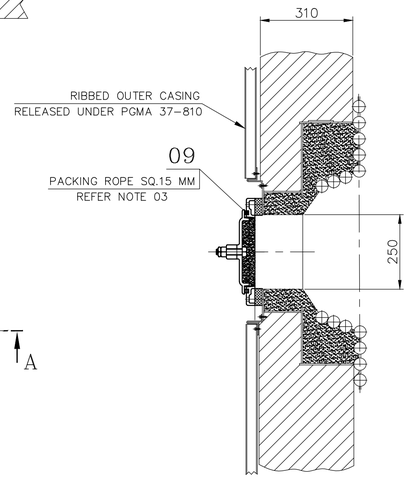
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(IN UPPER FURNACE)



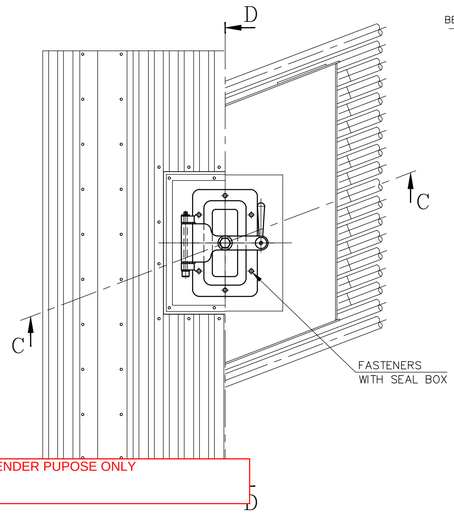
SECTION-BB



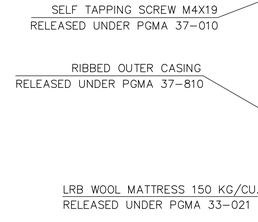
OBSERVATION DOOR 100X250
IN VERTICAL WALLS



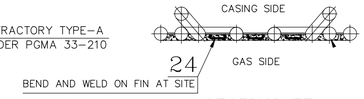
SECTION-DD



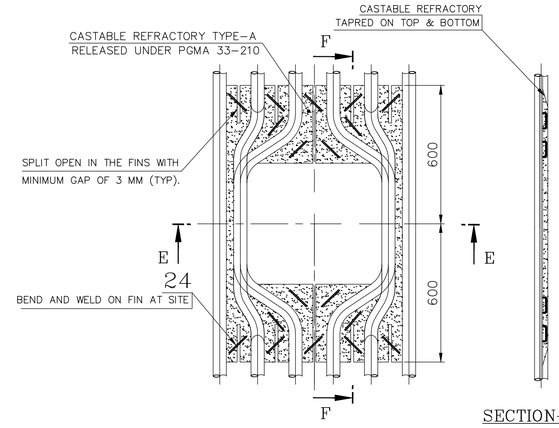
OBSERVATION DOOR 100X250
IN SPIRAL WALLS



SECTION-CC

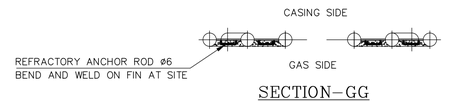


SECTION-EE

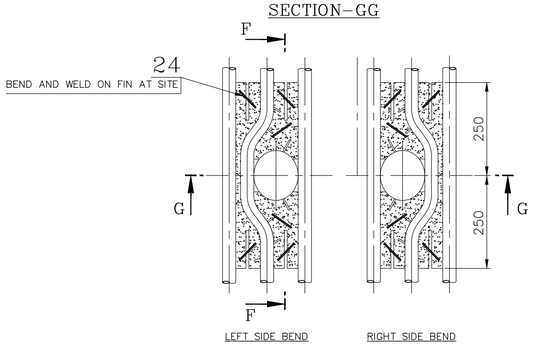


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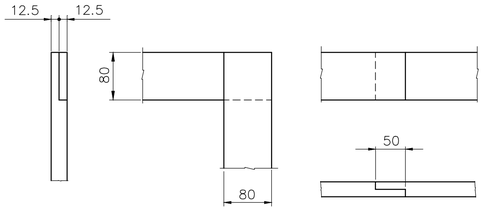
REFRACTORY ARRANGEMENT AT
ACCESS DOOR OPENING IN SCW



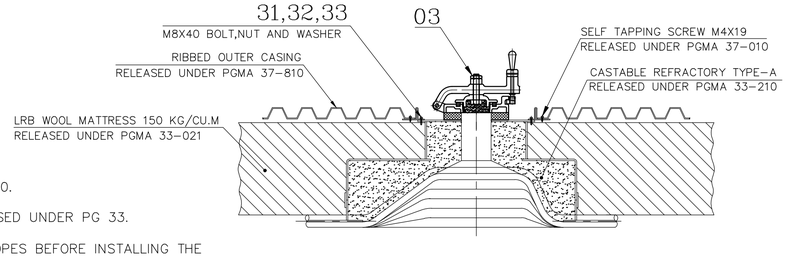
SECTION-GG



REFRACTORY ARRANGEMENT AT
LRSB OPENING IN BACK PASS



TYPICAL FIXING DETAIL OF MILL BOARD
TO BE LAMINATED WITH FEVICOL SEE NOTE 04



SECTION-CC
(IN LOWER FURNACE)

NOTES:

01. MATERIALS ARE RELEASED UNDER PGMA 28-220.
02. INSULATION AND LINING MATERIALS ARE RELEASED UNDER PG 33.
03. REPLACE THE COTTON ROPES BY ASBESTOS ROPES BEFORE INSTALLING THE DOORS IN POSITION AT SITE.
04. MILL BOARDS (DU 010) ARE TO BE LAID SUITABLY AT SITE TO THE SHAPE OF THE RESPECTIVE MOUNTING PLATE.
05. PAINT THE SURFACE OF TUBES WHICH ARE EMBEDED IN CASTABLE REFRACTORY WITH A THICK COAT OF BLACK BITUMINUOUS PAINT (IS:158).
06. NECESSARY CUTTING,BENDING,FABRICATION,ETC. MAY BE DONE AT SITE ACCORDING TO SITE CONDITIONS AND REQUIREMENTS.
07. FOR LOCATION OF DOORS REFER DRG. NO. 0-00-230-21854.

REV.	DATE	ALTD :
01.		CHD&APPD:
ZONE		

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CUSTOMER Nos.: 1700, 1701

CUSTOMER: NTPC LIMITED

PROJECT: BARH SUPER THERMAL POWER PROJECT
STAGE-II (2x660MW) - UNIT NO 4&5
STEAM GENERATOR PACKAGE

BHARAT HEAVY ELECTRICALS LIMITED.,
BOILER PLANT UNIT; TIRUCHIRAPALLI-620014

	NAME		DATE
DRN	C.S.RAJ		19.12.11
CHD	C.G.S		20.12.11
APPD	C.G.S		22.12.11

TITLE: FIXING DETAILS OF OBSERVATION DOOR IN FURNACE

ALL DIMENSIONS IN MILLIMETRE
PROJECTION
SCALE N T S

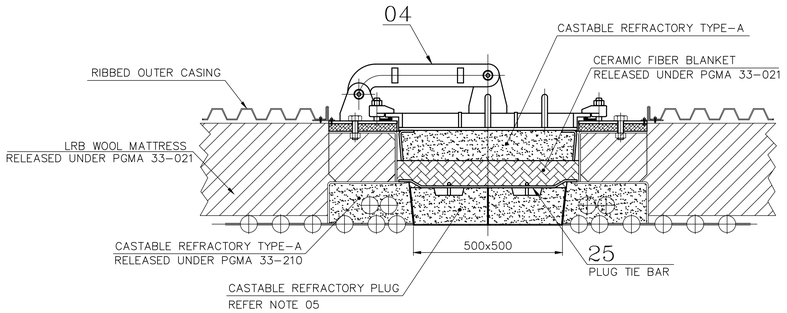
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REV.

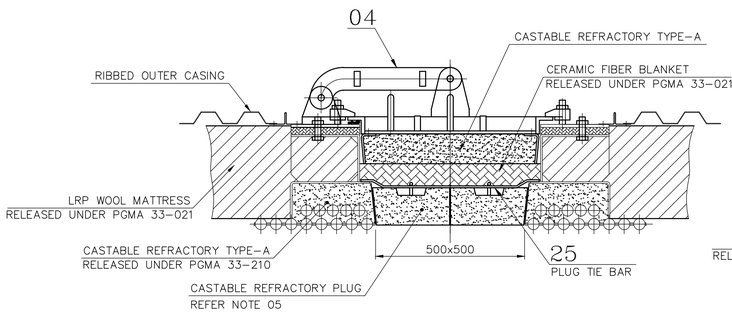
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DRAWING NO: 1-00-230-06923

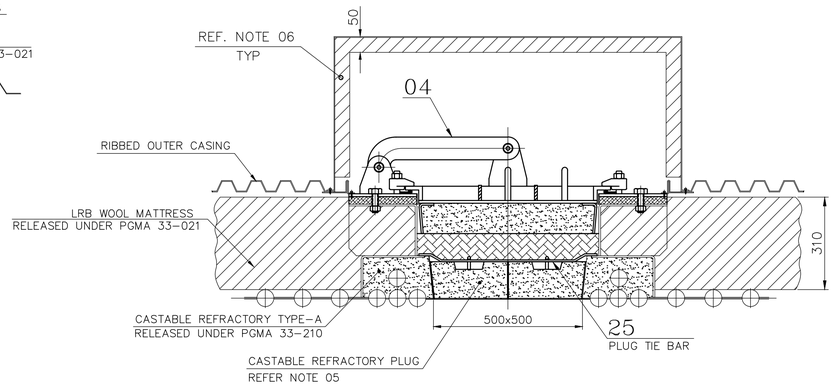
FOR TOLERANCES OF UNTOLERANCED DIMENSIONS DURING MANUFACTURE REFER PLANT STD. NO TP 023 0299



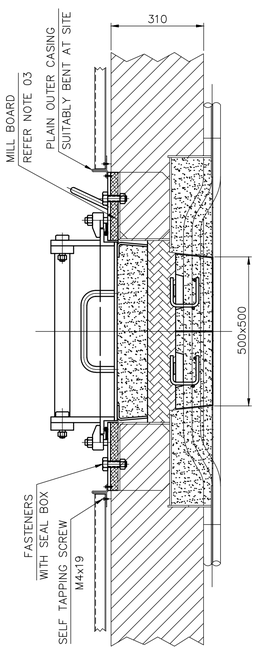
SECTION-AA
(IN EXTENDED FURNACE)



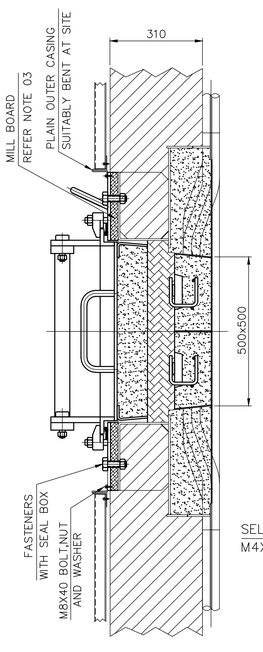
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(IN UPPER FURNACE)



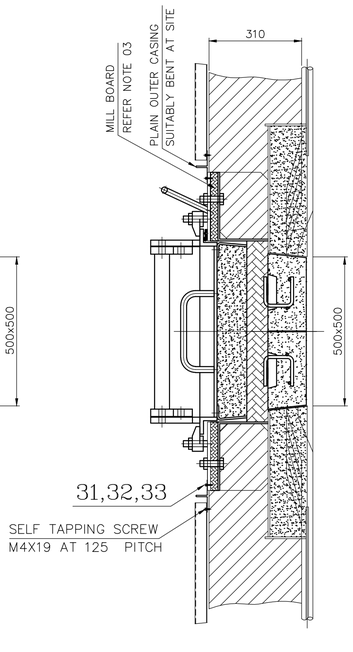
SECTION-AA
(IN BACK PASS SIDE WALL)



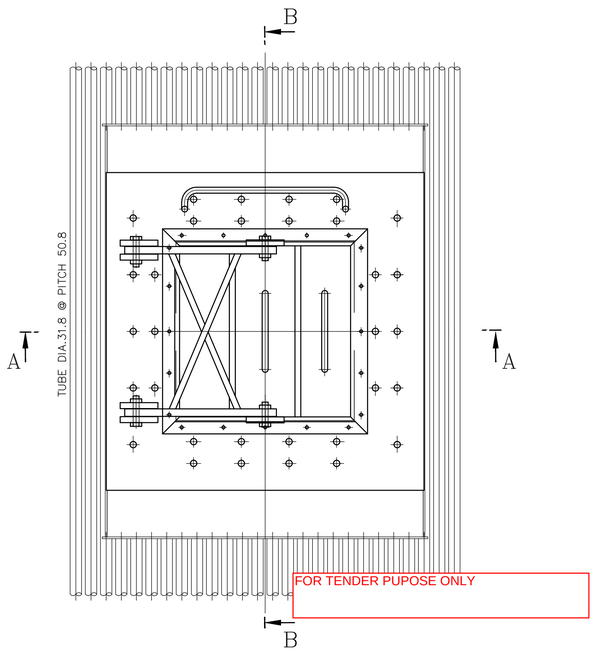
SECTION-BB
(IN BACK PASS SIDE WALL)



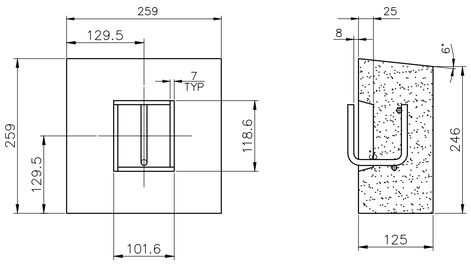
SECTION-BB
(IN EXTENDED FURNACE)

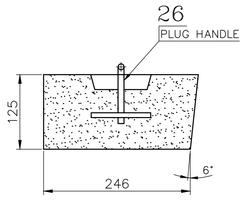


SECTION-BB
(IN UPPER FURNACE)



ACCESS DOOR 500x500

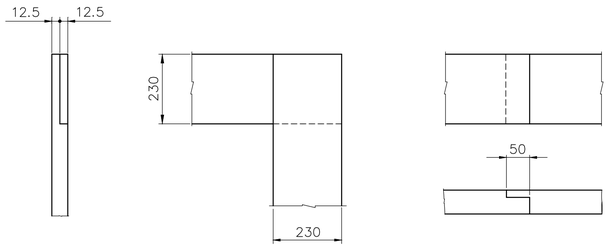




DOOR PLUG
REFRACTORY ARRANGEMENT

SPECIAL NOTE:

DOOR PLUG 4 NOS PER DOOR SHALL BE CAST AT SITE AS PER DIMENSIONS GIVEN IN THE DRAWING.



FOR CORNERS FOR WIDTH

TYPICAL FIXING DETAIL OF MILL BOARD
TO BE LAMINATED WITH FEVICOL SEE NOTE 03

NOTES:

01. MATERIALS ARE RELEASED UNDER PGMA 28-220.
02. INSULATION AND LINING MATERIALS ARE RELEASED UNDER PG 33.
03. MILL BOARDS (DU 010) ARE TO BE LAID SUITABLY AT SITE TO THE SHAPE OF THE RESPECTIVE MOUNTING PLATE.
04. PAINT THE SURFACE OF TUBES WHICH ARE EMBEDED IN CASTABLE REFRACTORY WITH A THICK COAT OF BLACK BITUMINUOUS PAINT (IS:158).
05. DOOR PLUG ARE TO BE KEPT INSIDE THE OPENING OF DOORS WHEN THE BOILER IS IN OPERATION.
06. BOX TO BE PROVIDED WITH 50 MM THICK L.B. WOOL MATTRESSES TO COVER THE FURNACE DOORS DURING OPERATION IF NECESSARY.
07. NECESSARY CUTTING,BENDING,FABRICATION,ETC. MAY BE DONE AT SITE ACCORDING TO SITE CONDITIONS AND REQUIREMENTS.
08. FOR LOCATION OF DOORS REFER DRG. NO. 0-00-230-21854.

CUSTOMER Nos.: 1700, 1701

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CUSTOMER
NTPC LIMITED

PROJECT
BARH SUPER THERMAL POWER PROJECT
STAGE-II (2x660MW) - UNIT NO 4&5
STEAM GENERATOR PACKAGE

BHARAT HEAVY ELECTRICALS LIMITED.,
BOILER PLANT UNIT; TIRUCHIRAPALLI-620014

	NAME		DATE
DRN	C.S.RAJ		19.12.11
CHD	C.G.S		20.12.11
APPD	C.G.S		22.12.11

TITLE
FIXING DETAILS OF
ACCESS DOOR IN FURNACE

REV.	DATE	ALTD :
01.		CHD&APPD:

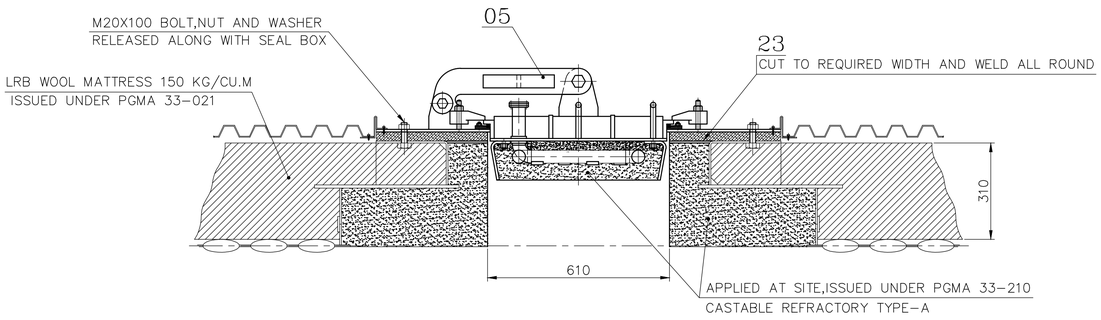
ZONE

ALL DIMENSIONS IN MILLIMETRE
PROJECTION
SCALE N T S
DRG.NO. 1-00-230-06923
REV.

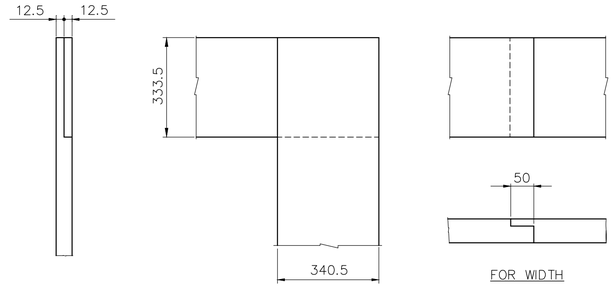
E-TENDER ENQUIRY NO.: PSER:PUR:BRH-S434:20 (ENQ:20:PP:0015:PUR:88) Date 05/03/2021.

DRAWING NO: 1-00-230-06924

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

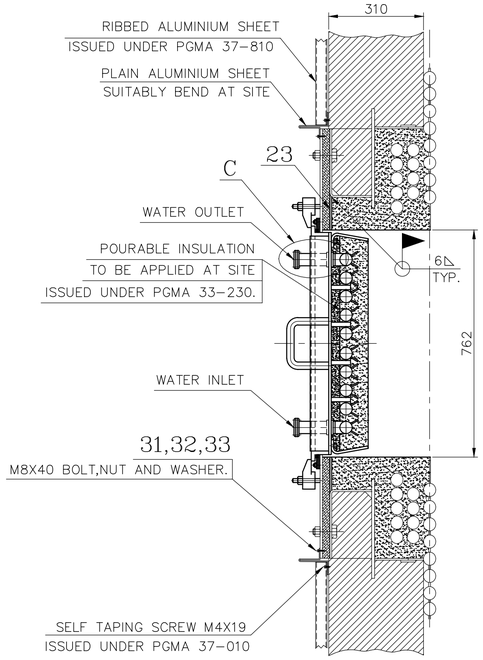


SECTION-AA

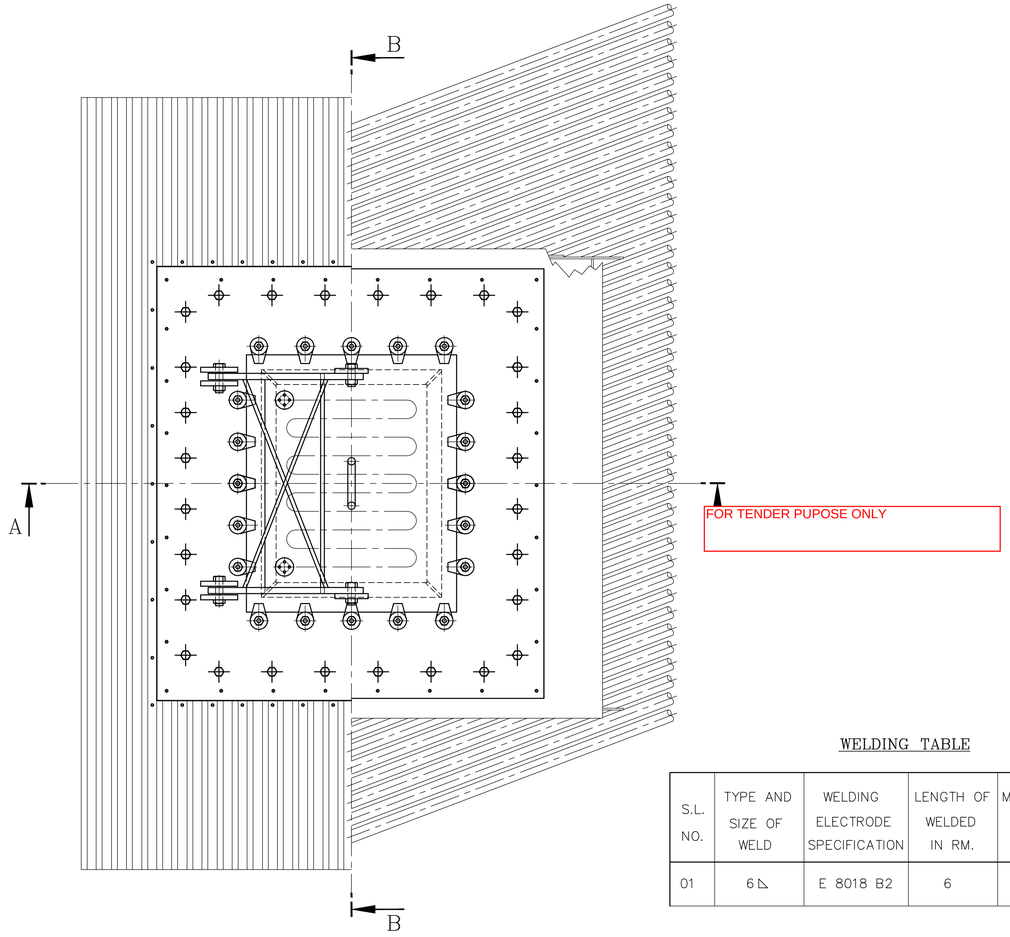


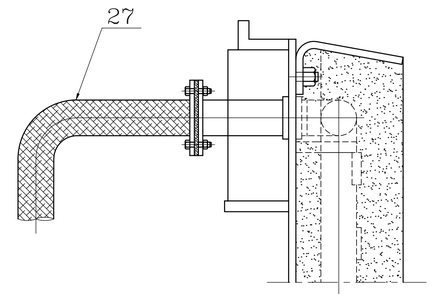
FOR CORNERS

TYPICAL FIXING DETAIL OF MILL BOARD
TO BE LAMINATED WITH FEVICOL SEE NOTE 06



SECTION-BB





DETAIL-G

WATER COOLED ACCESS DOOR 610 X 762

NOTES :

01. EACH WATER COOLED ACCESS DOOR REQUIRES COOLING WATER OF 900 KGS/HOUR.
02. COOLING WATER PRESSURE 2 KG/CM^2
03. PRESSURE DROPS OF COOLING WATER 0.07 KG/CM^2
04. TEMPERATURE RISE OF COOLING WATER 16°C.
05. THE INLET AND OUTLET TUBES OF WATER COOLED ACCESS DOOR HAS TO BE CONNECTED WITH THE INLET AND OUTLET COOLING WATER SUPPLY LINES BY MEANS OF FLEXIBLE HOUSE. USE DU.NO:027 OF PGMA 28-220.
06. MILL BOARDS (DU 010) ARE TO BE LAID SUITABLY AT SITE TO THE SHAPE OF THE RESPECTIVE MOUNTING PLATE.
07. FOR LOCATION OF DOORS REFER DRG. NO. 0-00-230-21854.

WELDING TABLE

S.L. NO.	TYPE AND SIZE OF WELD	WELDING ELECTRODE SPECIFICATION	LENGTH OF WELDED IN RM.	MATERIAL / PART TO BE WELEDED
01	6◺	E 8018 B2	6	AS + AS

REV.	DATE	ALTD :
01.		CHD&APPD:
ZONE		

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CUSTOMER Nos.: 1700, 1701

CUSTOMER: NTPC LIMITED

PROJECT: BARH SUPER THERMAL POWER PROJECT
STAGE-II (2x660MW) - UNIT NO 4&5
STEAM GENERATOR PACKAGE

BHARAT HEAVY ELECTRICALS LIMITED.,
BOILER PLANT UNIT; TIRUCHIRAPALLI-620014

	NAME		DATE
DRN	C.S.RAJ		19.12.11
CHD	C.G.S		20.12.11
APPD	C.G.S		22.12.11

TITLE: FIXING DETAILS OF WATER COOLED ACCESS DOOR

ALL DIMENSIONS IN MILLIMETRE | PROJECTION | SCALE N T S | DRG.NO. 1-00-230-06924 | REV.

FOR TENDER PUPOSE ONLY

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IN ANY WAY DETRIMENTAL TO THE INTEREST OF BHEL

PROCEDURE FOR APPLICATION AND CURING OF CASTABLE REFRACTORY

APPLICATION OF REFRACTORY:

Empty one bag of refractory.Homogenise it by thoroughly mixing it,by hand or trowel,in dry condition.Add Water,little by little,and mix the castable,until corrrect consistancy is achieved.This can be checked by making a ball, and tossing it and catching it.The ball should retain its shape.The mixed material should be applied within 10 to 15 minutes.And also refer Supplier's recommendations.

CURING OF REFRACTORY WORK:

Curing of refractory means,retaining the moisture for a minimum period in order to ensure the proper hydration of the binder.Curing of exposed castable surfaces should start after the surface has become firm.This can be tested when a finger rubbed across the surface comes away clean or when the surface feels warm to the touch.Moisture loss for the first 24 hours,after the material has been installed shall be retarded.Initial set occurs within one or two hours.

Castable should be cured for 24 hours. Moist conditions can be maintained by protecting with damp sacking or plastic sheet which should not come into immediate contact with the refractory or alternatively by dry coating the castable with an impervious organic based Sealing compound.In some instances,satisfactory results can be obtained by sprinkling water over the surface.It should be watered for a period of 20to24 hours after 4to5 hours of construction.The rate of water application should be carefully controlled to prevent washing of the fines and to prevent collection of pools in low spots.Shield the surface from direct sunlight atleast for about 48 hours. 8 hours after casting and pouring,remove the wooden frames which have no load bearing function in order to permit watering of the lateral parts of the structures.In case of steel frames apply water without stripping them.

INSULATION	PREPARED	T.GNANASEHARAN	30.03.2002	DRAWING NO : 4-00-205-08525	REV
	CHECKED	A.KUMARESAN			
	APPROVED	C.GUNASEKARAN			

FOR TENDER PUPOSE ONLY

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PROCEDURE FOR APPLICATION AND CURING OF CASTABLE REFRACTORY

On completion of the curing period,the application of moisture should be stopped.The exposed castable should be allowed to air dry for 24 hours. Natural air drying of castable after curing will actually cause slight increase in strength.The castable can be air dried indefinitely without adverse effect. Optimum results can be obtained with a drying period of 48 hours.

Before lighting the boiler for drying the setting,the following shall be attended:

1.All dirt and foreign objects sticking to tube surfaces are to be removed to ensure a thoroughly clean surface.

2.Expansion joints are to be cleaned and inspected for the proper function-ing of expansion during operation.

3.Test sample of castable refractory is to be taken from entry door regions to determine the moisture content in the laboratory.

Samples of castable are to be taken for the determination of moisture content before and after drying.When the moisture content drops below 0.5% the castable is considered to be dry and the boiler is ready for commissioning.All results of measurement should be duly recorded.

CARE OF THE REFRACTORY WORK:

The refractory work is subjected to considerable thermal stresses during boiler operation.Sudden application of heat or cooling introduces severe stresses and endangers the refractory work.Even when the boiler is operated on the recommended regime,possibilities of damages occuring to the refractories (due to several reasons such as bad workmanship,poor quality, slag deposition,corrosive atmosphere etc) must be kept in mind.The following simple rules are to be observed:

INSULATION	PREPARED	T.GNANASEHARAN	30.03.2002	DRAWING NO : 4-00-205-08526	REV
	CHECKED	A.KUMARESAN			
	APPROVED	C.GUNASEKARAN			

FOR TENDER PUPOSE ONLY

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IN ANY WAY DETRIMENTAL TO THE INTEREST OF BHEL

PROCEDURE FOR APPLICATION AND CURING OF CASTABLE REFRACTORY

1.Avoid sudden cooling of the furnace after a shut down.A cooling rate of 20 to 30°C per hour for the refractory lining in the initial period is recommended.This means that FD fans must be stopped after a shut down of the boiler.Ventilation of the furnace by natural draft is permissible only after 6 hours of a shut down.Forced cooling can be started only after 16 hours.

2.Avoid quick heating of the furnace.Boiler starting diagram is usually a reliable guide.

3.Thoroughly examine the refractory work during shut downs for cracks, chipping off,spalling etc.During operation also this can be checked periodically by visual examination throuh observation doors.

Whenever defects are noticed,arrange for their quick elimination,by shutting down the boiler at the earliest depending on the seriousness of the defect.

4.Abnormal heating of outside metal sheet covering of the boiler and hot spots are usually a good indication of damaged refractory and insulation in this area.The leakage of flue gas will spoil the property of wool mattresses within a short time.

5.Keep the access door,observation doors etc.properly shut.They are entry points for cold air and this cold air can damage the refractory work by localised cooling.

6.STORAGE INSTRUCTIONS:

a)The material is hygroscopic in nature.Prolonged storage (more than a period of six months) results in detoriaration of properties.In such cases, material should be tested before use,to ascertain the suitability.

b)Once drenched in water,the material become unsuitable for use.

c)All metal surfaces,that are embedded and also all metal surfaces that come in contact with this material,should be painted with two coats of anticorrosive black bituminous paint,before application of the material.

INSULATION	PREPARED	T.GNANASEHARAN	30.03.2002	DRAWING NO : 4-00-205-08527	REV
	CHECKED	A.KUMARESAN			
	APPROVED	C.GUNASEKARAN			

FOR TENDER PUPOSE ONLY

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IN ANY WAY DETRIMENTAL TO THE INTEREST OF BHEL

PROCEDURE FOR APPLICATION AND CURING OF POURABLE INSULATION

METHOD OF APPLICATION AND CURING:

1. Typical applications are for insulating,behind buckstays and areas such as roofs having multiplicity of hangers,rods and other penetrations.
2. The application of pourable insulation can be accomplished by pouring, pumping,or gunning.
3. Density of the pourable insulation installed and cured is around 600 to 650 Kg/m^3.
4. Pourable insulation is a hydraulic setting insulation. Adhesives or air entertainment agents shall not be used.
5. a) Empty the entire bag at a time and mix the whole material so that segregated particles get mixed.
   b) The pourable insulation should be thoroughly mixed with cool clean water to develop casting and pumping consistencies.
   c) The correct quantity of water shall be placed in the mixer before adding the dry pourable insulation,normaly about 70% to 100 % by weight.However this has to be confirmed from the Supplier's instructions.
   d) Mixing time shall not be less than 2 minutes or more than 5 minutes.
   e) Dried out material shall not be remixed.
   f) Pourable insulation once mixed must be applied in position within 15 minutes.
6. a) All areas where pourable insulation will be placed must be free of scale,rust,dust,or other loose material.
   b) All pourous forms used such as wood etc.shall be oiled before pouring.

INSULATION	PREPARED	T.GNANASEHARAN	30.03.2002	DRAWING NO : 4-00-205-08528	REV
	CHECKED	A.KUMARESAN			
	APPROVED	C.GUNASEKARAN			

E-TENDER ENQUIRY NO.: PSER:PUR:BRH-S434:20 (ENQ:20:PP:0015:PUR:88) Date 05/03/2021.
FOR TENDER PUPOSE ONLY

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IN ANY WAY DETRIMENTAL TO THE INTEREST OF BHEL

PROCEDURE FOR APPLICATION AND CURING OF POURABLE INSULATION

c) All obsorbent surfaces such as insulation,brick,concrete,shall be made wet to prevent water obsorption.

7. a) The surface of pourable insulation once in place will become firm in approximately two hours.These surfaces should be kept damp with an occasional light spray or covering with a cloth that is kept damp,for the entire 24 hours curing period.

b) Application of moisture after 24 hours should be stopped.Forms etc. should be removed and the material is allowed to dry for 24 hours.

8. For mixing and spraying, the water should be clean and cold.

9. The shuttering,scaffolding moulds should be removed after the material has attained initial setting.

10. STORAGE INSTRUCTIONS:

a)The material is hygroscopic in nature.Prolonged storage (more than a period of six months) results in detoriaration of properties.In such cases, material should be tested before use,to ascertain the suitability.

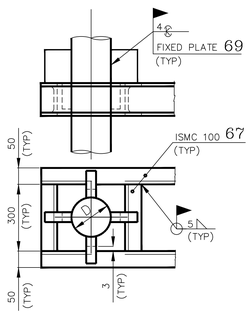
b)Once drenched in water,the material become unsuitable for use.

c)All metal surfaces,that are embedded and also all metal surfaces that come in contact with this material,should be painted with two coats of anticorrosive black bituminous paint,before application of the material.

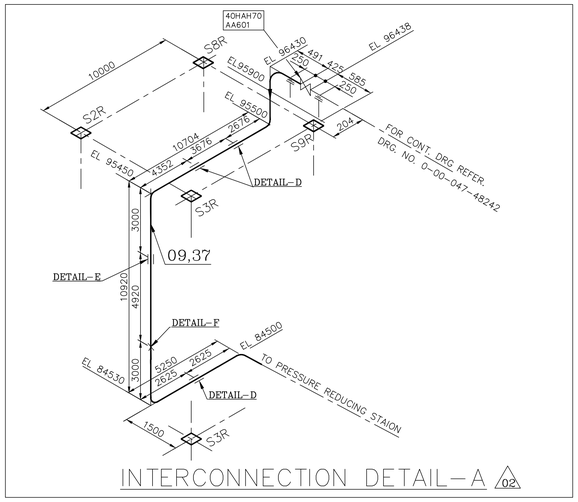
INSULATION	PREPARED	T.GNANASEHARAN	30.03.2002	DRAWING NO : 4-00-205-08529	REV
	CHECKED	A.KUMARESAN			
	APPROVED	C.GUNASEKARAN			

DRAWING NO: 0-21-600-00396

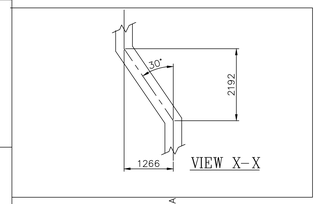
FOR TOLERANCES OF UNTOLERANCED DIMENSIONS DURING MANUFACTURE REFER PLANT STD. NO TP 023 0299

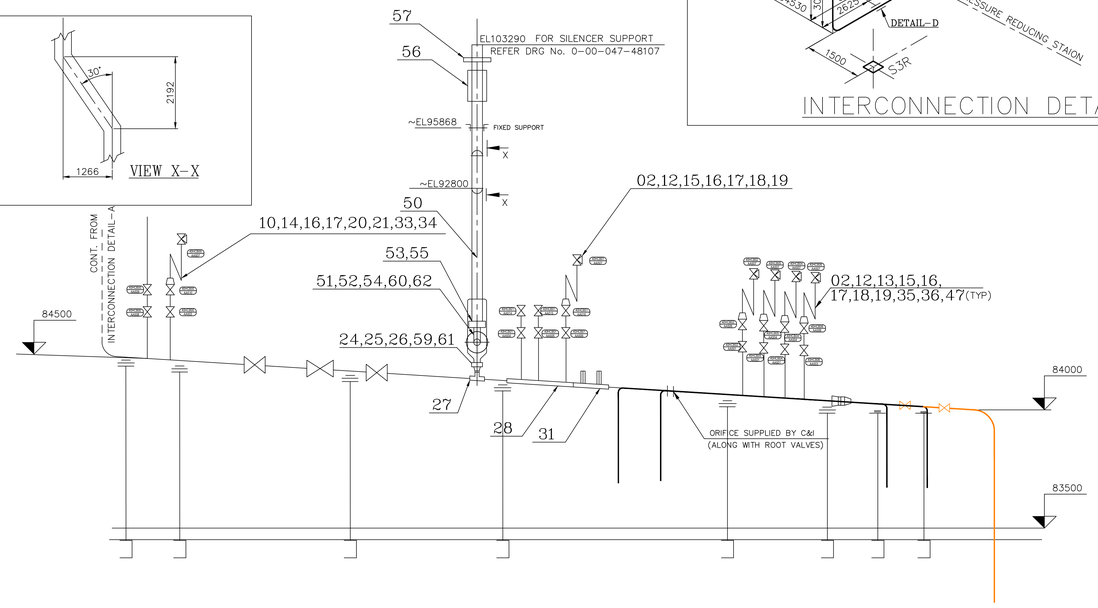


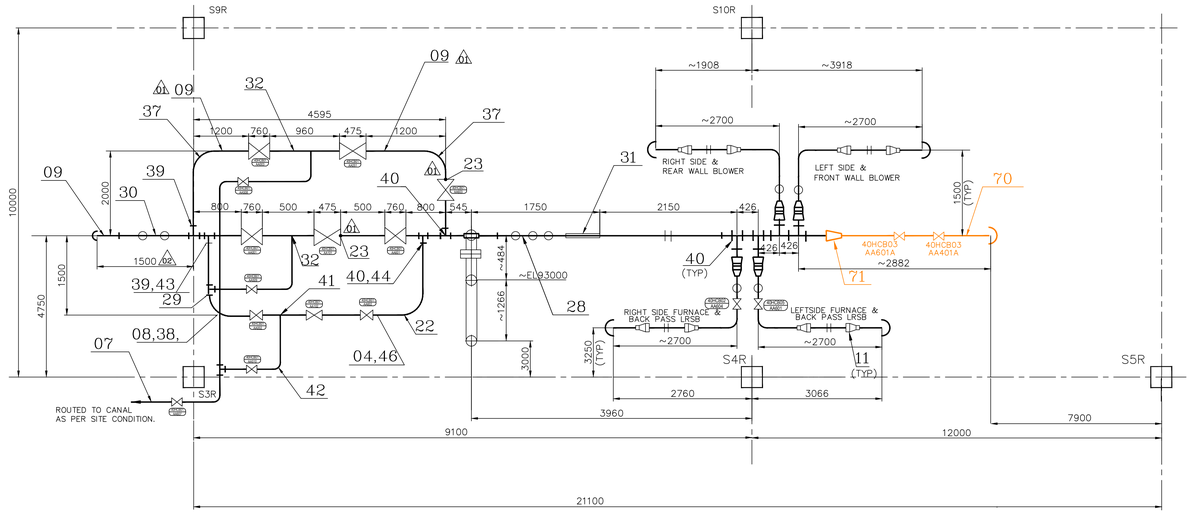
DETAIL – F 02
(FIXED SUPPORT)



INTERCONNECTION DETAIL – A 02







DESIGN PARAMETERS: –

	BEFORE PRV	AFTER PRV
01. DESIGN PRESSURE .....:	274.2 kg/sq.cm(g)	40.0 kg/sq.cm(g)
02. DESIGN TEMPERATURE :	566.8° C	415° C

03. HYDRAULIC TEST TO BE DONE AT SITE.

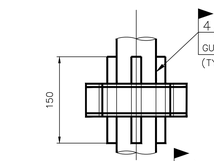
NOTES: –

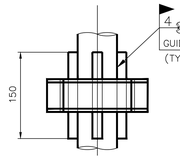
01. DESIGN,FABRICATION AND INSPECTION AS PER IBR.
02. FOR GENERAL ERECTION NOTES REF DRG. No.: 2–21–600–00080.
03. FOR WELDING DETAILS REFER ERECTION WELDING SCHEDULE.
04. ROUTING SHOWN IN THIS DRAWING ARE SUGGESTIVE,MINOR CHANGES CAN BE MADE TO SUIT ACTUAL SITE CONDITIONS.
05. FOR SUPPORT DETAILS REFER CHART–E. , DRG No. 0–21–600–00397
06. DRIP PAN DRAIN PIPE ø34.2 x 3.2(ISSUED UNDER PGMA 24–220) MAY BE ROUTED TO CONNECT WITH THE NEAREST AIR VENT TRAY DRAIN PIPE.

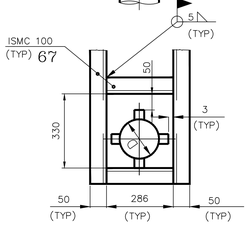
FOR TENDER PURPOSE ONLY

REFERENCE DRAWINGS: –

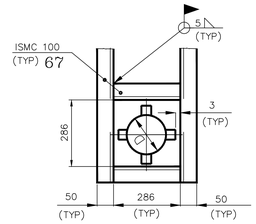
01.SCHEME OF SOOT BLOWING SYSTEM WITH VALVES,FITTINGS & INSTRUMENTATION REFER DRG.No.0–00–047–47888







DETAIL – D 02
(GUIDE SUPPORT)



DETAIL – E 02
(GUIDE SUPPORT)

ISSUED UNDER PGMA 21–600

011	71	REDUCER AS D127X12.5 /D73X5.16	4–21–600–02840		SA182F22CL3		NO L	1	
008	70	PIPE D73X5.16	3–21–600–00727	1	SA335P22		NO L	4	
009	69	PLATE 10 X 150 X 200			SA387GR22CL2		NO L	4	
009	68	PLATE 10 X 75 X 150			SA387GR22CL2		NO L	20	
004	67	ISMC100					M L	4	
02	66	NOT APPLICABLE							
A 03	65	NOT APPLICABLE							
02	64	NOT APPLICABLE							
02	63	NOT APPLICABLE							
006	62	NUT HEX GR B T425 M20					NO L	16	
005	61	NUT HEX GR A T425 M16					NO L	16	
002	60	STUD BOLT GR A T425 M20 x 120					NO L	8	
001	59	STUD BOLT GR A T425 M16 x 100					NO L	8	
	58	NOT APPLICABLE							
023	57	PLATE FOR SLEEVE	S 4740 – 0845/01	53	IS2062 Fe410A		NO L	1	
022	56	SLEEVE 4"	S 4740 – 0843/02	53	API 5L Gr.B		NO L	1	
021	55	COVER PLATE PL.5:D485/D277			IS2062 Fe410A		NO L	1	
020	54	GASKET 4"	S 4740 – 0841/01	53			NO L	1	
019	53	DRIP PAN 4"	S 4740 – 0833/03	53	WELDMENT		NO M	1	
018	52	SOW FLANGE 4" 150#			SA105	C	NO L	1	
017	51	BW LR ELL 4"			SA234WPB	C	NO L	1	
012	50	ERW PIPE D273.1X6.40					M L	30	
011	49	ERW TUBE NB32 MEDIUM					M L	50	
010	48	ERW TUBE NB25 MEDIUM					M L	40	

ISSUED UNDER PGMA 21–600

011	47	SW EQ TEE 2" CL6000			SA182F22CL3	A	NO L	6	
057	46	CONNECTING PIECE	4–21–600–02506		SA335P22	A	NO L	2	
056	45	90° BEND AS D33.4 x 9.09	4–21–600–02447		SA335P91	A	NO L	10	
054	44	CONNECTOR D127.0 x12.5/D88.9 x 5.49	4–21–600–02484		SA182F22CL3	A	NO L	5	
053	43	CONC.REDU D127x20 / D88.9 x 15.24	4–21–600–02475		SA234WP91	A	NO L	1	
052	42	90° sw ELBOW NB 25 9000 ANSI B16.11			SA182F91	A	NO L	5	
050	41	PIPE WITH STUB D88.9 / D33.4	3–21–600–00646		WELDMENT	A	M L	1	
049	40	BW EQ TEE D127 x 12.5	4–21–600–02504		SA234WPCL1	A	NO L	6	
048	39	BW EQUAL TEE D127 x 20	3–21–600–00648		SA234WP91	A	NO L	2	
046	38	90 DEG BEND AS D88.9x15.24	4–21–600–02446		SA335P91	A	NO L	2	
045	37	90 DEG LR ELBOW D127.0x20.0	4–21–600–02540		SA234WP91	A	NO L	7	
044	36	CONNECTOR AS M20x1.5 M20x1.5 / 1–2"NPT(IPG)	4–21–600–02003		SA182F22CL3	A	NO L	3	
043	35	CONNECTOR AS M20x1.5 M20x1.5 / 1–2"NPT(IPG)	1–21–600–02002		SA182F22CL3	A	NO L	3	
042	34	CONNECTOR AS M20x1.5 M20x1.5 / 1–2"NPT(IPG)	4–21–600–02443		SA182F91	A	NO L	1	
041	33	CONNECTOR AS 3/4"–10 BSW / 1/2" NPT(IPG)	4–21–600–02442		SA182F91	A	NO L	1	
040	32	PIPE WITH STUB/TE D127.0x033.4	3–21–600–00645		WELDMENT	A	M L	2	
039	31	PIPE WITH STUB /TE/ TW/AS D127 x 12.5	3–21–600–00643		WELDMENT	A	M L	1	
038	30	PIPE WITH STUB AS D127.0–D33.4	3–21–600–00642		WELDMENT	A	M L	1	
037	29	SW STRAIGHT TEE NB 25 9000 ANSI B16.11			SA182F91	A	NO L	3	
034	28	PIPE WIRH STUB AS D127.0/D33.4	3–21–600–00651		SA335P91	A	NO L	1	
033	27	PIPE WITH STUB (SV) D108 / D88.9	4–21–600–02440		WELDMENT	A	NO L	1	
032	26	SOCKET FOR SV DRAIN	4–21–600–00968		SA105	C	NO L	1	
031	25	CAF JOINTING GR O/2–1.5MM	4–21–600–00388		AA 21503		NO L	2	
030	24	FLANGE 2 1/2" 600#–(AS)	4–21–600–02441		SA182F22CL3	A	NO L	1	
029	23	CONNECTING PIECE	4–21–600–02505		SA335P22	A	NO L	2	
028	22	90 DEG BEND AS D88.9x5.49	4–21–600–02507		SA335P22	A	NO L	2	
026	21	SCH.PIPE COND LOOP ASSEMBLY (AS)	2–21–600–00142		WELDMENT	A	M L	1	
025	20	SCH.PIPE COND LOOP ASSEMBLY (AS)	2–21–600–00141		WELDMENT	A	M L	1	
024	19	INSPECTER 'S PR GAUGE ASSY.–AS	2–21–600–00137		WELDMENT	A	M L	3	
023	18	CONNECTOR LOOP ASSY (AS)	2–21–600–00136		WELDMENT	A	M L	3	
022	17	PACKIND D17MM	6127–0143		WELDMENT		NO L	9	
021	16	PACKIND D15.5MM	6127–0143		WELDMENT		NO L	3	
020	15	CAP SCREW 3/4" 10BSW–AS	4–24–600–00972		SA182F22CL3	A	NO L	3	
019	14	CAP SCREW 3/4" 10BSW–AS	4–21–600–02444		SA182F91	A	NO L	1	
017	13	BW RED 2x1"SCH160			SA234WP22CL1	A	NO L	2	
016	12	BW RED 1x0.5"SCH160			SA234WP22CL1	A	NO L	2	
014	11	CONNECTOR AS D88.9 x5.49/D60.3x5.54	4–24––600–02495		SA182F22CL3	A	NO L	4	
012	10	CONC. RED SCH XXS –1"/1/2"ANSIB16.9			SA234WP91	A	NO L	2	
010	09	PIPE D127.0x20.0 L=52m			SA335P91	A	NO L	1	
009	08	PIPE D88.09x15.24 L=24m			SA335P91	A	NO L	1	
008	07	PIPE D33.4x9.09 L=60m			SA335P91	A	NO L	1	
007	06	PIPE D21.3x7.47 L=12m			SA335P22	A	NO L	1	
006	05	PIPE D127.0x12.5 L=60m			SA335P91	A	NO L	1	
004	04	PIPE D88.9x5.49 L=8m			SA335P22	A	NO L	1	
003	03	PIPE D60.3x5.54 L=15m			SA335P22	A	NO L	1	
002	02	PIPE D33.4x4.55 L=35m			SA335P22	A	NO L	1	
001	01	PIPE D21.3x4.78 L=102m			SA335P22	A	NO L	1	

VARIANT NUMBER	ITEM NO	DESCRIPTION	STD	DRAWING NUMBER	ITEM NO / VAR NO	MATERIAL CODE / MATERIAL SPECN	A/C/P	SAP / DI	UNIT WEIGHT / QUANTITY	ISS. ZONE

REV	DATE	ALTERED : SAJI .P .J	REV	DATE	ALTERED : P.DEEPAK	REV	DATE	ALTERED : P.DEEPAK
03	24.07.19	CHD & APPD : V.G.S	02	23.05.13	CHD & APPD : I.GOPALAN	01	22.03.13	CHD & APPD : I.GOPALAN
ZONE		AH SB LINE SIZE MODIFIED	ZONE C7 C3.01 E1.3 F10 K2		INTERCONNECTION PIPE ROUTING DETAIL–A MODIFIED. DETAIL–D,E,& F ADDED. ITEM–37, QTY REVISED. ITEM–69 ADDED. DIMENSION REVISED.	ZONE J–3		CONNECTING PIECE LOCATION & ITEM NO .CORRECTED AS INDICATED BY 01

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TYPE OF PRODUCT OR NAME OF CUSTOMER/PROJECT: BARH–II– 2x660MW(UNIT–4&5) CUST. Nos.: 1700 & 1701

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

	NAME	SIGNATURE	DATE
DRN	P.DEEPAK		08/09/12
CHD	I.GOPALAN		08/09/12
APPD	I.GOPALAN		08/09/12

ORG	ALL DIMENSIONS ARE IN MM	PROJECTION	SCALE	WEIGHT (Kg)
BM			NTS	–

CODE: 121

REF TO ASSY / OLD DWG:

TITLE: SOOTBLOWER PR. REDUCTION STATION

DRAWING NO : 0-21-600-00396 REV 03

DRAWING NO. 0-21-600-00399

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

SL. No.	SUPPORT TYPE	DESCRIPTION	No.OF ASSY.	DRAWING No.	SL. No. / ITEM NO	1	2	3	4	5	6	7
01	↓	SINGLE TIE ROD HANGER TYPE-2.5"	1	–	ITEM NO	38	39	40	41	42		

CHART-A

DESIGN PARAMETERS:-

01. DESIGN PRESSURE.....: 40.0 kg/sq.cm (g)
02. DESIGN TEMPERATURE...: 415° C
03. HYDRAULIC TEST TO BE DONE AT SITE.

NOTES:-

01. DESIGN,FABRICATION AND INSPECTION AS PER IBR.
02. FOR GENERAL ERECTION NOTES REF DRG. No.: 2-21-600-00080.
03. FOR WELDING DETAILS REFER ERECTION WELDING SCHEDULE.
04. ROUTING SHOWN IN THIS DRAWING ARE SUGGESTIVE,MINOR CHANGES CAN BE MADE TO SUIT ACTUAL SITE CONDITIONS.
05. DURING PIPE ROUTING IT MAY BE ENSURED THAT PROPER HEAD ROOM IS AVAILABLE AT ALL FLOORS.
06. FOR SUPPORT DETAILS REFER CHART-E. OF DRG NO. 0-21-600-00398 & CHART A OF THIS DRAWING
07. FOR HYDRAULIC TESTING OF AH BLOWER PIPING,USE BLANK FLANGES AND PACKINGS OF ITEM Nos.21,05 ARE TO BE USED.

REFERENCE DRAWINGS:-

01.SCHEME OF SOOT BLOWING SYSTEM WITH VALVES,FITTINGS AND INSTRUMENTATION REFER DRG.No.: 0-00-047-47888 & 0-00-047-47889.

FOR TENDER PURPOSE ONLY

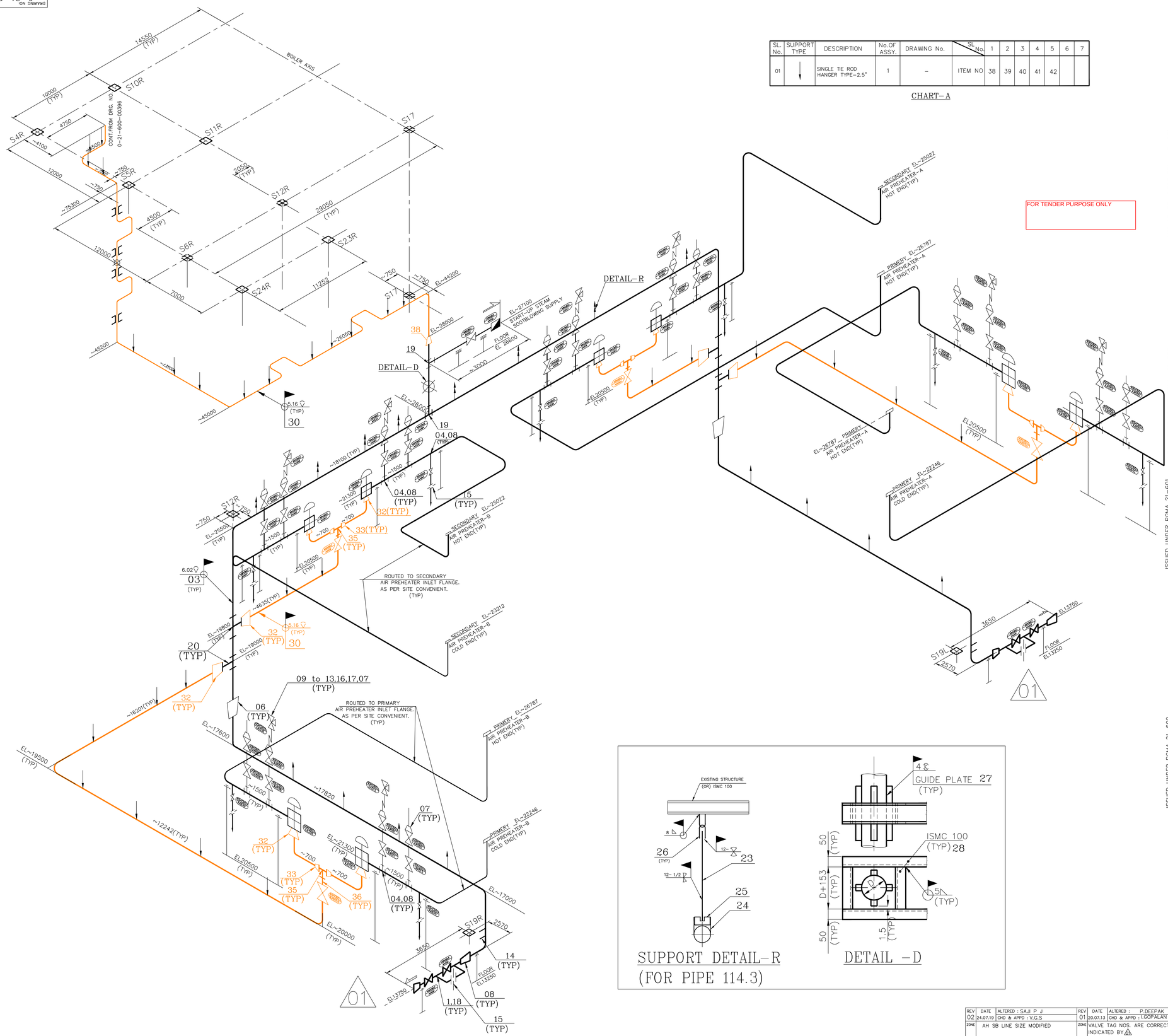
VARIANT NUMBER	ITEM NUMBER	DESCRIPTION	STD	DRAWING NUMBER	ITEM NO / VAR NO	MATERIAL CODE / MATERIAL SPECN	A/C/P	UNIT	UNIT WEIGHT / QUANTITY	IDS	ZONE
	017	42	EYE HANGER NB100		4-21-801-09900	01 IS2062FE410GRA	N	NO			
								L	80		
	016	41	SUPPORT PLATE		4-21-601-02891	SA387GR22CL2	N	NO			
								L	80		
	015	40	PIPE GUIDE INSLN & SUP PL OD 73		3-21-601-00654	06 SA387GR22CL2	N	NO			
								L	80		
	014	39	SUSPENSION PLATE 73		4-21-601-02890	IS2062E250GRA	N	NO			
								L	40		
	013	38	PIPE CLAMP ROD TYPE D73		4-21-601-02889	SA2062FE410A	N	NO			
								L	40		
	016	37	BW REDUCER 4"X2.5" SCH160			SA234WPB	A	NO			
								L	1		
	015	36	PIPE D88.9X5.49		3-21-600-00692	04 SA335P22	A	M			
								L	2		
	014	35	BW EQUAL TEE 3" SCH 160			SA234WP22CL2	A	NO			
								L	4		
	013	34	SPIRAL WOUND GASKET 2" 300#			591544600000	N	NO			
								L	4		
	012	33	REDUCER AS D88.9X11.13 D73X5.16		4-21-600-02844	SA182F22CL3	A	NO			
								L	10		
	010	32	REDUCER D73X5.16/ D60.3X5.54		4-21-600-02842	SA182F22CL3	A	NO			
								L	12		
	009	31	90 DEG BEND AS OD 73X5.16		4-21-600-02877	SA335P22	A	NO			
								L	44		
	008	30	PIPE D73.0X5.16		3-21-600-00727	01 SA335P22	A	M			
								L	189		
	015	29	MOUNTING ARRGT. OF RWSE		3-03-000-00014	IS1079FE330		NO			
								L	8		
	004	28	ISMC 100			IS206E250A		NO			
								L	24		
	036	27	PIPE GUIDE PLATE		3-21-601-00654	SA387GR12CL2		NO			
								L	24		
	032	26	EYE HANGER NB100		4-21-601-01708	IS2062Fe410A		NO			
								L	24		
	031	25	SUSPENSION PLATE D114.3		4-21-601-02511	IS2062Fe410A		NO			
								L	12		
	030	24	PIPE CLAMP (ROD TYPE) NB100		4-21-601-01706	IS2062Fe410A		NO			
								L	9		
	033	23	ROUND D12			IS2062Fe410A		MR			
								L	40		
		22						NO			
								L			
	xxx	21	GASKET (AHB)	S	6114-2096			NO			
						CAFJOINTG A/S		L	10		
	055	20	PIPE WITH STUB D114.3 D114.3X6.02/D60.3X5.54		3-21-600-00652		A	NO			
						WELDMENT		L	4		
	051	19	BW EQ TEE 114.3X6.02				A	NO			
						SA403WP304H		L	4		
	047	18	SW EQ TEE 1"CL 6000				A	NO			
						SA182F22CL3		L	6		
	044	17	CONNECTOR AS 3/4"-10 BSW /1/2" NPT(IPG)		4-21-600-02003		A	NO			
						SA182F22CL3		L	8		
	043	16	CONNECTOR AS M20X1.5 / 1/2" NPT(IPG)		4-21-600-02002		A	NO			
						SA182F22CL3		L	8		
	036	15	ORIFICE PLATE ARRGT.-1"(AS)		3-21-600-00650		A	NO			
						WELDMENT		L	10		
	035	14	ASSEMBIY FOR THERMOCOUPLE-AS		3-21-600-00653		A	NO			
						WELDMENT		L	4		
	024	13	INSPECTOR "S PR GAUGE ASSY-AS		2-21-600-00137		A	NO			
						WELDMENT		L	8		
	023	12	CONDDENSING LOOP ASSY (AS)		2-21-600-00136		A	NO			
						WELDMENT		L	8		
	022	11	PACKING D17MM		6127-0143		A	NO			
						WELDMENT		L	24		
	021	10	PACKING D15.5MM		6127-0143		A	NO			
						WELDMENT		L	8		
	020	09	CAP SCREW 3/4" 10BSW-AS		4-21-000-00972		A	NO			
						SA182F22CL3		L	8		
	017	08	BW RED 2X1" SCH160				A	NO			
						SA234WP22CL1		L	20		
	016	07	BW RED 1X0.5"SCH160				A	NO			
						SA234WP22CL1		L	16		
	015	06	CONNECTOR AS D114.3 X 6.02/D60.3X5.54				A	NO			
						SA182F22CL3		L	4		
	013	05	BLIND FLG 2"CL300				A	NO			
						SA105		L	8		
	011	04	SW EQ TEE 2"CL6000				A	NO			
						SA182F22CL3		L	29		
	005	03	PIPE D114.30 X6.02 L=60				A	NO			
						SA335P22		L	1		
	003	02	PIPE D60.3 X 5.54 L=165				A	NO			
						SA335P22		L	1		
	002	01	PIPE D33.4 4.55 L=15m				A	NO			
						SA335P22		L	1		

ISSUED UNDER PGMA 21-600

ISSUED UNDER PGMA 21-600

ISSUED UNDER PGMA 21-600

ISSUED UNDER PGMA 21-600



REV	DATE	ALTERED :	
02	24.07.19	CHD & APPD : V.G.S	
ZONE		AH SB LINE SIZE MODIFIED	

REV	DATE	ALTERED :	
01	20.07.13	CHD & APPD :	T.GOPALAN
ZONE		VALVE TAG NOS. ARE CORRECTED AS INDICATED BY △1	

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TYPE OF PRODUCT OR NAME OF CUSTOMER/PROJECT: BARH-2 x 660MW CUST. NOs.:1700 & 1701

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

	NAME	SIGNATURE	DATE
DRN	P.DEEPAK		21/09/12
CHD	I.GOPALAN		15/10/12
APPD	K.PERIASAMY		29/10/12

355-052

DEPT: BM | CODE: 121 | ALL DIMENSIONS ARE IN MM | PROJECTION | SCALE: N.T.S. | WEIGHT (Kg): – | REF TO ASSY / OLD DWG

TITLE: SOOT BLOWER PIPING & SUPPORTS (WALL BLOWER)

DRAWING NO : 0-21-600-00399 | REV 02

TP-DG-1-00-047-47130
CORPORATE DRG ID

E-TENDER ENQUIRY NO.: PSER:PUR:BRH-S434:20 (ENQ:20:PP:0015:PUR:88) Date 05/03/2021.

DRAWING NO. 1-00-047-47130

GENERAL NOTES FOR ERECTION OF BOILER TRIM PIPING

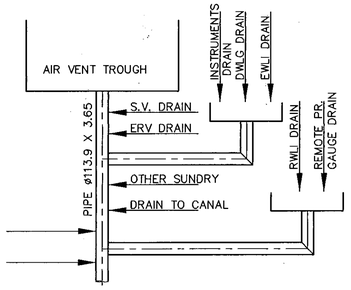
(THIS DRG.SUPERSEDES DRG.NO.1-00-047-40273 ISSUED EARLIER)

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

1. THIS GENERAL NOTE COVERS GUIDE LINE FOR ERECTION OF COMPONENTS ISSUED UNDER PGMA 24-X00, 24-X01, 24-X15 24-355, 24-700, 24-X65, 24-X75. THE CONNECTED ERECTION DRAWINGS ARE ISSUED UNDER PGMA 00-047.
2. THE VARIOUS REFERANCE DRAWINGS AND INTER-RELEATED DRAWINGS ARE MEINTIONED IN A SEPARATE DRG. ISSUED AS LIST OF ERECTION DRGS RELEASED UNDER 00 - 047 ITSELF. THIS SHOULD BE REFERED FOR ALL INTER LINKING OF DRAWINGS REQUIRED FOR ERECTION.
3. EACH VALVE TAG NO. IS ENCIRCLED BY THE SIDE OF THE VALVE.
4. REFER PR.PARTS ERECTION CHECK LIST FOR OTHER GUIDELINES REGARDING TRIM PIPING ERECTION.
5. WELDING, HEAT TREMENT,RADIOGRAPHY IS AS PER THE WELDING SCHEDULE.
6. PIPES UP TO NB 50 (2" SCH PIPE) UP TO A THICKNESS OF 8mm ARE ISSUED AS THE RUNNING METRE ITEM FOR CARBON STEEL.SIMILARLY, PIPE UP TO 2" SCH PIPE OF THICKNESS 6.3mm ISSUED UNDER RUNNING METRE ITEMS FOR ALLOY STEEL PIPES WHEREVER REQUIRED BENDS ARE TO BE FABRICATED AT SITE WITH SUITABLE HEAT TREATMENT PROCEDURE RECOMMENDED REDIUS OF BEND FOR FABRICATION AT SITE IS AS FOLLOWS.

NOMINAL PIPE SIZE IN INCHES	MINIMUM RADIUS OF BEND IN - mm
1/2" (D21.3)	100
1" (D33.4)	150
11/2"(D48.3)	200
2" (D60.3)	240

7. SMALL BORE PIPES AND BENDS UP TO NOMINAL PIPE SIZE 1 1/2" MAY PREFERABLY BE AIR BLOWN BEFORE ERECTION TO AVOID POSSIBLE CHOKING OF THE CIRCUIT AFTER COMPLEATION.
8. ALL STRUCTURAL MEMBERS FOR THE VARIOUS FRAMES FOR SUPPORT OF VALVES; HANGERS, ETC; ARE ISSUED AS RUNNING METRE ITEMS. THIS HAS TO BE SUITABLY CUT AND SIZES AS REQUIRED AND FABRICATED AT SITE.
9. THE HORIZONTAL LINES OF ALL DRAINS SHALL BE SUITABLY HAVING A SLOPE OF 2° TO 3° TOWARDS THE DRAIN PIT. LIKEWISE THE VENT LINES SHOULD HAVE SUITABLE UPWARDS SLOPE; SO THAT ANY CONDENSED WATER CAN FLOW BACK TO THE MAIN COMPONENT.
10. SPACING OF THE VALVES FOR FRAME ARRANGEMENT FOR SUPPORTS SHOULD BE TENTATIVELY CHECKED FOR CONVENIENCE OF INSULATION AND OPERATION. THEN ONLY THE FRAMES ARE TO BE FABRICATED. THIS IS TO HAVE A GOOD AESTHATIC APPEARANCE.
11. THE SPACING OF THE VALVE FRAMES SHALL BE TOWARDS THE EDGE OF THE PLATFORMS KEEPING MAXIMUM WALK-WAY AND APPROACH SPACE FOR MAINTENANCE.
12. THE AIR VENT TRAY DRAIN SHALL BE SUITABLY BROUGHT DOWN TO THE CANAL THROUGH ø113.9 X 3.65 AND THE PIPES SHALL BH ROUTED NEAR A COLUMN WITH PROPER SUPPORTS. OTHER INSTRUMENT DRAINS SHALL BE SUITABLY CONNECTED TO THE AIR VENT TRAY DRAIN PIPE THROUGH A TUNDISH (AS SHOWN BELOW)



13. FOR THE CONVENIENCE OF INSULATION, SUITABLE GAP (AT LEAST 150mm) SHOULD BE MAINTAINED BETWEEN THE PIPE AND THE NEAREST STRUCTURAL MEMBER.
14. THE VARIOUS STUB LOCATION ON THE MAIN STEAM LINE, HOT REHEAT LINE AND COLD REHEAT LINE SHALL BE CONNECTED TO THE VALVES CONSIDERING THE TAG Nos GIVEN IN THE SCHEME AND THE PIPING DRAWING, SOME OF THE VALVES ARE ISSUED UNDER PG 80 AND SOME OF THE VALVES ARE ISSUED UNDER PG 24.WHEREVER THE BOILER SCHEME SHOWS TAG Nos THE VALVES ARE ISSUED UNDER BOILER GROUP UNDER 24-X60. ALL UN-TAGED VALVES IN BOILER PACKAGE ARE ISSUED BY PIPING CENTRE/MADRAS UNDER PG 80.
15. FOR ALL BUTT WELDED ENDS, THE RUNNING METRE PIPES, BENDS HAVE TO BE CUT AND EDGE PREPARED ACCORDING TO THE CONNECTING VALVE/TEE/REDUCER,ETC AND THE EDGE PREPARATION SHALL BE AS PER DRAWING TP-062-0599
16. WHEREVER SPRING CAGE ASSEMBLY IS INDICATED IN THE SUPPORT DRAWING, THE LOCATION SHOULD BE MAINTAINED AS FOR AS POSSIBLE WITH IN PLUS OR MINUS 200mm ALONG THE LENGTH OF THE PIPE.ANY MAJOR DEVIATION FROM THIS IS TO BE APPROVIED BY BHEL TRICHY.
17. WHEREVER DRILL HOLE SIZE FOR PITCH ARE NOT MENTIONED IN THE DRAWING FOR PIPE CLAMPS AND "U" BOLTS, THE FOLLOWING GUIDELINES MAY BE TAKEN.

TABLE-A

PIPE CLAMP ROD TYPE NOMINAL PIPE SIZE	PITCH	DRILL HOLE SIZE
NB 10 (D14)	28	ø9.5
1/2 (OR) NB15 (D21.3)	34	ø9.5
1" (D33.4)	46	ø9.5
11/2" (D48.3)	61	ø9.5
2" (D60.3)	74	ø11.5
21/2" (D73)	92	ø13.5
3" (OR) NB80 (D88.9)	109	ø13.5
NB100 (D108)	137	ø18.0
4" (D114.3)	142	ø18.0
5" (D127.0)	155	ø18.0
NB150 (D159.0)	186	ø18.0
6" (D168.3)	186	ø18.0
NB200 (D219.1)	247	ø22.0
NB250 (D273.0)	302	ø22.0

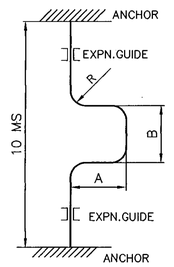
TABLE-B

"U"BOLT PIPE WITH INSULATION(WITH SUPP.PL.) NOMINAL PIPE SIZE	PITCH	DRILL HOLE SIZE
1/2 (OR) NB15 (D21.3)	34	ø9.5
1" (D33.4)	46	ø9.5
11/2" (D48.3)	61	ø9.5
2" (D60.3)	74	ø11.5
21/2" (D73)	88	ø11.5
3" (OR) NB80 (D88.9)	107	ø11.5
NB100 (D108)	123	ø11.5
4" (D114.3)		
5" (D127.0)	146	ø11.5
NB150 (D159.0)	186	ø11.5
6" (D168.3)	192	ø11.5
NB200 (D219.1)	241	ø13.5
NB250 (D273.0)	296	ø13.5

18. FOR LONG VERTICAL LINES, EXPANSION LOOPS MAY BE PROVIDED AT EVERY 10 METRE MINIMUM ONE NO AS PER THE DETAILS MENTIONED BELOW.

TABLE-C

NOMINAL PIPE SIZE	RADIUS	ABOVE 420°C		BELOW 420°C	
	R	A	B	A	B
1/2" (OR) NB15 (D21.3)	100	1000	600	600	600
1" (D33.4)	150	1000	600	800	600
11/2" (D48.3)	200	1500	800	1000	800
2" (D60.3)	240	1500	1000	1200	1000
21/2" (D73)	300	1800	1000	1200	1000



19. WHEREVER PIPES/STRUCTURAL MEMBERS PENETRATE THROUGH THE ASBESTOS ROOF SUITABLE PROVISIONS LIKE WEATHER PROOFING TO BE PROVIDED TO PREVENT RAIN WATER ENTRY (SIMILAR TO SAFETY VALVE ESCAPE PIPE) REQUIRED MATERIALS ARE TO BE LOCALLY ARRANGED AT SITE OUT OF ERECTION MATERIALS & SURPLUS MATERIALS.
20. THE PIPING BETWEEN THE PRESSURE PART AND THE FIRST ROOT VALVE FOR SOME OF THE SMALL BORE ITEMS PR.GAUGE. INSTRUMENT CAN BE SUPPORTED WITH SUITABLE LUGS OF EXTENSION FROM PRESSURE PARTS IF AVAILABLE. THIS IS TO GIVE BETTER FLEXIBILITY FOR THE PIPING BETWEEN THE VALVE AND THE STUB. MINIMUM ONE EXP.LOOP TO BE PROVIDED BEFORE SUPPORTING WITH TUBE CLIP.
21. THE FOLLOWING GUIDE LINES MAY USED FOR HORIZONTAL RUN OF SUPPORTING PIPES & TUBES.

FOR HORIZONTAL RUN

ALL TUBES & PIPES SHALL BE SUPPORTED WITH MAXIMUM UNSUPPORTED LENGTH NOT EXCEEDING THE FOLLOWING.

NOMINAL PIPE SIZE	SPAN
NB 10 (D14)	2 METERS
1/2" (OR) NB15 (D21.3)	2 METERS
1" (D33.4)	2.5 METERS
11/2" (D48.3)	3 METERS
2" (D60.3)	3 METERS
21/2" (D73)	4.5 METERS
NB100 (D108)	5 METERS

22. THE GUIDE LINES GIVEN IN THIS DRG.TO BE FOLLOWED ONLY FOR THOSE LINES WHICH ARE NOT EXPLICITLY DETAILS IN ERECTION WHEREVER FULL ROUTING IS SHOWN IN ERECTION DRG. THE DETAILS SHOWN IN DRG. TO BE FOLLOWED DUE TO STRUCTURAL INTERFERENCE OR OTHER PIPING INTERFERENCE THERE MAY BE MINOR REROUTING. IT IS SUGGESTED THAT THE TEMPORARY SUPPORTSS MAY BE USED UP TO HYDRAULIC TEST AND AFTER HYDRAULIC TEST FINAL SUPPORTS CAN BE ERECTED WITH THE APPROVAL OF PRESSURE PARTS / STRESS ANALYSIS GROUP. THIS IS TO MAINLY ENSURE THE FINAL ROUTING AND SUPPORTS ARE FULLY TAKING CARE OF THE PIPING FLEXIBILITY REQUIREMENTS.
23. WELDING DETAILS FOR HANGER COMPONENTS REFER DRAWING NO. 2-00-047-47003.
24. FOR NAME PLATE HOLDER TYPE "A" & "B" REFER DRAWING NO. 2-00-047-47025.
25. FOR SCHEDULE PIPE SIZE REFER DRAWING NO. 4-00-047-41302 & 4-00-047-41303.
26. SOCKET WELD DETAILS REFER DRAWING NO. 4-00-047-47591.
27. THE SH / RH SPRAY CONTROL VALVES SH / RH BLOCK VALVES & SB PR.REDUCING VALVE SHOULD NOT BE INSTALLED DURING INTIAL ERECTION. AFTER COMPLETION OF LINES AND ACID CLEANLINESS OF PIPING CONTROL VALVES SHOULD BE INSTALLED. THIS IS TO AVOID ENTRAPMENT OR ELECTRODE OR OTHER METAL PIECES CAUSING DAMAGE TO SEAT DURING COMMISSIONING.
28. FOR THE CIRCULATING PUMP SYSTEM, DWLG, RWLI, EWLI & CONTROL VALVE ERECTION REFER FQA MANUAL RESPECTIVE O & M ALSO.
29. ALL SPRING CAGE ASSY ARE TO BE LOCKED DURING ERECTION / HYDRAULIC TEST.
30. WHEREVER DISCREPENCIES ARISES DETAILS GIVEN IN INDIVIDUAL DRAWING HOLDS GOOD.
31. ROUTING SHOWN IN THE ERECTION DRAWINGS ARE SUGGESTIVE,MINOR CHANGES CAN BE MADE TO SUIT ACTUAL SITE CONDITIONS.
32. DURING PIPE ROUTING IT MAY BE ENSURED THAT PROPER HEAD ROOM IS AVAILABLE AT ALL FLOORS.

FOR TENDER PURPOSE ONLY

REV	DATE	ALTERED :	REV	DATE	ALTERED :	REV	DATE	ALTERED :	REV	DATE	ALTERED :
01		CHD & APPD :	03	6-02-2001	CHD & APPD :	02	01-04-98	CHD & APPD :	01	12-08-93	CHD & APPD :
ZONE			ZONE		NOTES 31 & 32 ADDED.	ZONE		1.NOTES 1 & 14 REVISED 2.NOTES 28,29 & 30 ADDED 3.TABLE A & B REVISED	ZONE		NOTE 26 REVISED AS MARKEDUP.

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TYPE OF PRODUCT OR NAME OF CUSTOMER/PROJECT

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

	NAME	SIGNATURE	DATE
DRN	B.SIVARAJ		12-01-90
CHD	G.S.RAGUNATHAN	-SIGN-	
APPD	G.S.RAGUNATHAN	-SIGN-	

355-053

DEPT	ALL DIMENSIONS ARE IN MM	PROJECTION	SCALE	WEIGHT (Kg)	REF TO ASSY / OLD DWG
BM			NTS		1-00-047-40273
CODE 121					

TITLE: GENERAL NOTES FOR ERECTION OF BOILER TRIM PIPING

DRAWING NO : 1-00-047-47130 REV 03

RETRACED

CORPORATE DRG ID TP-DG-1-00-047-47130

TP-DG-2-00-047-47003
CORPORATE DRG ID

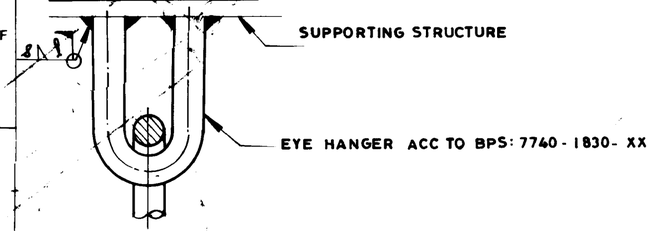
E-TENDER ENQUIRY NO.: PSER:PUR:BRH-S434:20 (ENQ:20:PP:0015:PUR:88) Date 05/03/2021.

FIRST ANGLE PROJECTION (ALL DIMENSIONS IN MILLIMETRES)

DRAWING NO. 2-00-047-47003

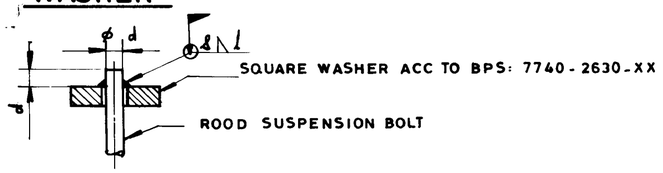
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1. WELDING OF EYE HANGER AND SUPPORTING STRUCTURE



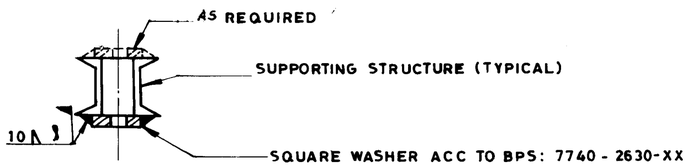
NOMINAL SIZE OF PIPE, Nb	WELD		NO OF WELDS
	SIZE s	LENGTH l ≈	
50 – 80	7	32	2
100	8	38	
150	10	50	
200 – 250	13	63	
300 – 550	15	79	

2. WELDING OF SUSPENSION BOLT/ROD AND SQUARE WASHER



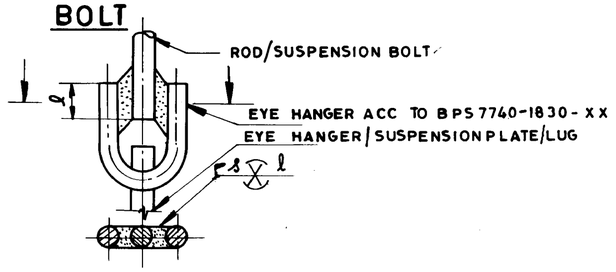
NOMINAL SIZE OF PIPE, Nb	WELD	
	SIZE, s	LENGTH, l ≈
50 - 80	7	32
100	8	38
150	10	50
250 - 300	13	69
300 - 550	15	79

3. WELDING OF SQUARE WASHER AND SUPPORTING STRUCTURE



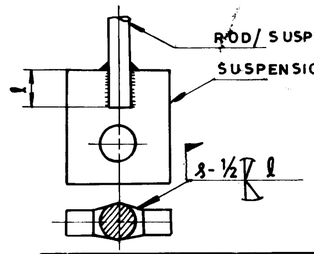
NOMINAL SIZE OF PIPE Nb	LENGTH OF WELD, l ≈	NO OF WELDS
50 - 80	250	2
100	250	
150	250	
200 - 250	340	
300 - 550	340	

4. WELDING OF EYE HANGER AND ROD/SUSPENSION BOLT



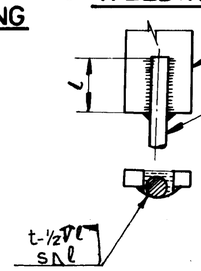
NOMINAL SIZE OF PIPE Nb	WELD		NO OF WELDS
	SIZE, s	LENGTH l ≈	
50 - 80	10	20	2
100	12	25	
150	16	30	
200 -250	20	40	
300 - 550	25	50	

5. WELDING OF SUSPENSION BOLT/ROD AND SUSPENSION PLATE.



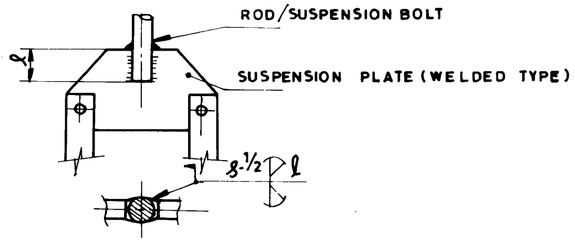
NOMINAL SIZE OF PIPE Nb	WELD		NO OF WELDS
	SIZE s	LENGTH l ≈	
50 - 80	10	20	2
100	12	25	
150	16	30	
200 - 250	20	40	
300 - 550	25	55	

6. WELDING OF BOLT AND PIPE CLAMP



NOMINAL SIZE OF PIPE Nb	WELD			NO OF WELDS
	SIZE 'S'	SIZE 't'	LENGTH, l ≈	
50	4	6	15	2
80	4	6	25	
100	6	6	25	
150	8	8	40	
200	12	8	40	
250	12	8	50	
300 & 350	16	8	50	
400 & 450	14	10	60	
500 & 550	14	10	80	

7. WELDING OF SUSPENSION PLATE (WELDED TYPE) AND ROD/SUSPENSION BOLT



NOMINAL SIZE OF PIPE Nb	WELD		NO OF WELDS
	SIZE 'S'	LENGTH, l ≈	
50 - 80	10	40	2
100	12	40	
150	16	45	
200 & 250	22	55	
300 - 550	25	60	

NOTES:

1. USE ELECTRODE E 7018 FOR WELDING.
2. PIPE SIZES GIVEN IN THE TABLES INDICATE THE SIZE OF PIPE FOR WHICH THE HANGER IS REQUIRED.

FOR TENDER PURPOSE ONLY

1155.411

TYPE OF PRODUCT OR NAME OF CUSTOMER/PROJECT

Bharat Heavy Electricals Ltd.,
BOILER PLANT UNIT
TIRUCHIRAPALLI - 620014

	NAME	SIGN	DATE	NO OF VAR.
DRN	B. SIVARAJ	B. Sivaraj		
CHD	R. MAHALINGAM	Rmahalingam		
APPD	R.M	Rmahalingam	5.11.21	

DEPT: PP/BMD | CODE: 121 | GRADE OF UNTOL DIM: C/M/F | SCALE: NTS | WEIGHT (KG): 1 | REF NO ASSY/OLD DRG: 710005-7500 | ITEM NO.

TITLE: SITE WELDING DETAILS FOR HANGER ASSEMBLY

CARD CODE: U 01 | DRAWING NO: 2-00-047-47003 | REV.

Size

TP-DG-2-00-047-47003
CORPORATE DRG ID