



INVITATION TO TENDER

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Ref: OS/SC/2023-24/155/92

Date: 05.03.2024

Sub: Service Contract for carrying out Electrical & Instrumentation Erection, Testing, Calibration, Loop checking and commissioning works for Fired Heater at GAIL USAR (S.O.7933). - Reg.

Tenders are invited under **two bid systems**, Techno-Commercial Bid (Part-I) and Price Bid (Part-II) from the reputed and experienced contractors with sound technical and financial capability for the subject work.

SL. NO.	NAME OF THE WORK
01	Service Contract for carrying out Electrical & Instrumentation Erection, Testing, Calibration, Loop checking and commissioning works for Fired Heater at GAIL USAR (S.O.7933)

1. ELIGIBILITY CRITERIA:

- I) Average annual turnover of the contractor during the last 3 years ending 31st March 23 should be **₹7.33 Lakhs**). Tenderer should enclose EPF, ESI, PAN, GSTIN New registration no., Income tax returns for last three years (AY2021-22, 2022-23 & 2023-24), Profit & Loss account and Balance Sheet certified by the Practicing Chartered Accountant for the last 3 years.
- II) The Contractor should have experience of completing similar works during the last 7 years ending **29th Feb 2024** as given below: -
 - (a) Three similar completed works costing not less than the amount **₹9.77** Lakh each.
OR
 - (b) Two similar completed works costing not less than the amount **₹12.22** Lakh each.
OR
 - (c) One similar completed work costing not less than the amount **₹19.55** Lakh.

Note:

Similar Works means carrying out Electrical and Instrumentation Erection, testing, Calibration, Loop checking and commissioning works in any Heaters / Columns / Vessels / Heavy Equipments

- III) The works executed in the own name of the tenderer will only be considered for eligibility criteria.
- IV) Work orders & Job Completion Certificates from the customer shall be enclosed in support of successful and satisfactory completion of the orders.

2. SCOPE OF THE WORK:

Work is to be carried out as per Scope of work, Special Terms & conditions (Annexure – I), Technical Conditions & Specifications (Annexure-II), General Conditions of Contracts – (works / services) (Annexure– III) and as per schedule of Quantities (Annexure-VIII)

3. LOCATION OF WORK

The site is located at GAIL-Usar (**near Alibaug**), **Maharastra**

4. WORK COMPLETION PERIOD:

Erection, testing, calibration, loop checking of instruments----- **3 Months**
 Commissioning ----- **1 Month**

However, the Instrumentation contractor must put up all the efforts to complete the work for all the units parallelly by increasing man power with required tools tackles resources and working in two shifts as per BHEL time schedules with their client and as per site requirements.

Exact date will be intimated later by a separate letter giving 1 week notice and instrumentation contractor must mobilise and start the work as per the schedule.

5. LIQUIDATED DAMAGES / PENALTY:

In the event of any delay in completion of work or part thereof as per the contractual time schedule due to the reasons attributable to contractor, BHEL - HPVP shall have the right to impose Liquidated Damage at the rate of 0.5% of the contract value per week delay subject to a maximum of 10% of the contract value.

6. SECURITY DEPOSIT

A. Security deposit means the security provided by the contractor towards fulfilment of any obligations in terms of the provisions of the contract.

B. The total amount of the security deposit will be **5% of the contract value**.

C. Modes of Deposit:

The balance amount to make up the required Security Deposit of **5%** of the contract value may be accepted in the following forms:

- i) Cash (as permissible under the extant Income Tax Act)
- ii) Local Cheques of Scheduled Banks (subject to realization)/ Pay Order/ Demand Draft/ Electronic Fund Transfer in favour of BHEL.
- iii) Bank Guarantee from Scheduled Banks/ Public Financial Institutions as defined in the company's act. The bank guarantee format should have the approval of BHEL.
- iv) Fixed Deposit Receipt issued by Scheduled Banks/ Public Financial Institutions as defined in the company's 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)

(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)

D. Collection of Security deposit:

At least 50% of the required security deposit, should be submitted before start of the work. Balance security deposit can be collected by deducting 10% of the gross amount progressively from each of the running bills of the contractor till the total amount of the required security deposit is collected. Security deposit shall be released to the contractor upon fulfilment of contractual obligations as per the terms of the contract.

E. Refund of Security Deposit:

- i) The security deposit shall be refunded after successful completion of the Contract as per agreement and subject to deduction of any amount due to BHEL.
 - ii) Security deposit shall not be refunded to the Contractor except in accordance with the terms of the Contract.
- F.** The successful tenderers shall furnish Security Deposit within 15 days from the date of Work Order / Letter of Intent. The Security Deposit shall be furnished by the successful tenderers before commencement of work by them.
- G.** The security deposit shall not carry any interest.

Note : Acceptance of Security Deposit against Sl. No. C(iv) and (v) above will be subject to hypothecation or endorsement on the documents in favour of BHEL. However, BHEL will not be liable or responsible in any manner for the collection of interest or renewal of the documents or in any other matter connected therewith.

- H.** Security Deposit / Bank Guarantee will be released after the maintenance period of 2 months or on closure of contract whichever is later.
- I.** Bidder shall agree to submit performance security required for execution of the contract within the time period mentioned. In case of delay in submission of performance security, enhanced performance security which would include interest (repo rate +4%) for the delayed period, shall be submitted by the bidder. Further if performance security is not submitted till such time the first RA bill becomes due, the amount of performance security due shall be recovered as per terms defined in NIT / contract, from the bills along with due interest.

7. INCOME TAX

Income tax as per statutory requirement will be deducted on each payment made to the contractor and TDS certificate will be issued to this effect.

8. TDS ON GST:

TDS on GST amount as per statutory requirement as applicable will be deducted on each payment made to the contractor. Present TDS on GST is 2%.

9. OVER RUN COMPENSATION (ORC) /IDLE CHARGES:

The contractor shall not be entitled to claim and the company shall not be liable to pay any amount on account of overrun compensation and idle charges, the overrun/ idling may be for whatsoever reasons.

10. PRICE VARIATION COMPENSATION (PVC):

The contractor shall be paid only at contract rate/ rates for the work executed and the contractor shall **not be entitled to claim or receive any extra amount on account of any price escalations either in materials, labour, taxes / duties etc.**, or for any reasons whatsoever and the contract rates are firm and fixed till the completion of the work in all respects.

11. PERFORMANCE GUARANTEE:

The contractor will be responsible for quality of the workmanship and shall guarantee the work done for a period of **18 (Eighteen) months** from the date of mechanical completion or **12 (Twelve) months** from the date of commissioning whichever is earlier.

12. INCOME TAX:

Income tax as per statutory requirement will be deducted on each payment made to the contractor and TDS certificate will be issued to this effect.

13. TDS ON GST:

TDS on GST amount as per statutory requirement as applicable will be deducted on each payment made to the contractor. Present TDS on GST is 2%.

14. LAW GOVERNING CONTRACT AND COURT JURISDICTION:

The contract shall be governed by the law in force in the Republic of India. The Civil court having original civil jurisdiction at Visakhapatnam for HPVP shall alone have exclusive jurisdiction in regard to all claims in respect of the contract. No other civil court shall have jurisdiction in case of any dispute under this contract.

15. MATERIAL ACCOUNTING:

The contractor shall fully account all the free issue materials and submit the material reconciliation statement which will be verified and certified by Engineer In-charge/Site In-charge, BHEL-HPVP. The store clearance has to be taken by the contractor and to be submitted along with final bill for processing final bill.

The surplus materials as well as the scrap after the material accounting shall be returned to BHEL by the contractor.

16. TERMS OF PAYMENT:

90% progressive payment based on work done against monthly RA bills. Balance **10 %** on completion and acceptance of work and submission of final bill along with relevant documents as per contract and after expiry of guarantee period/defect liability period. However, this retention amount can be released on commencement of **guarantee period** and on submission of **equivalent Performance bank guarantee** valid for **Defect liability period** plus claim period of 3 months. **Defect liability period** will be **18 (Eighteen) months** from the date of mechanical completion or **12 (Twelve) months** from the date of commissioning whichever is earlier.

The detailed billing break-up to be prepared and to be approved by BHEL-HPVP for submission of monthly RA bill after award of job.

17. MODE OF PAYMENT:

The mode of payment and measurement of work completed shall be as per relevant clauses of General Conditions of contract and Special Conditions of the contract.

Payment will be released only through RTGS/ NEFT within 45 days for MSE/60 Days for medium/90 days for Large Enterprises. All documents required for the same as specified are to be submitted by contractor along with the bill.

RA bill

Contractor to submit **monthly RA bill** along with following documents.

- a) Invoice
- b) GST Paid Statement (**Billing is to be done on Maharashtra GSTIN**)
- c) Detailed work measurement / Work Completion Certificate by BHEL Site In- charge.

FINAL BILL

Final bill shall be submitted after completion of all works and material reconciliation along with following documents as specified in General Conditions of contract.

- a) Invoice
- b) GST Paid Statement (**Billing is to be done on Maharashtra GSTIN**)
- c) Work Completion Certificate by BHEL Site In- charge.
- d) No Claim certificate by Contractor.

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- e) Clearance Certificates wherever applicable viz. site Clearance Certificates from Customer, PF, ESI and Payment of Labour Paid statement/ challans etc. Indemnity Bond as per prescribed format.

Note: Final bill means last month bill for service contracts. In case of works, final bill means bill for finally executed quantity.

Note:

- 1) No advance in any form is payable by BHEL.
- 2) All payments will be released only through RTGS/ NEFT. Format for bank account details (Refer Annexure-B) duly Filled and certified through bank should be enclosed.

18. VALIDITY OF THE OFFER :

The offer shall be valid for a period of **3 months** from the last date for tender submission.

19. CONSTRUCTION POWER & WATER:

- a) Water shall be provided on **chargeable basis** at one point @ 0.5% of the executed contract value but further distribution to the work location is to be carried out by the contractor. DM water, if required for Hydrotesting shall be arranged by the contractor.
- b) Power will be provided at one point allotted by M/s EIL / GAIL on **Chargeable Basis @Rs.12 per Unit**. Power Distribution Board with suitable capacity Switch Fuse unit as incomer, all outgoing with necessary safe trips like MCB, ELCB etc., as per the industrial safety norms and their installation, all outgoing cables from Distribution Board, termination at the distribution board, cabling for the distribution of Power & Working Area Lighting shall be arranged by the contractor.

In case of power failure, the contractor shall have to make their own alternate arrangement for smooth functioning of the work without any extra cost to BHEL.

20. PRICE SCHEDULE, TAXES & DUTIES:

- a. Prices shall be quoted in the price schedule attached to the tender for the complete scope of work.
- b. The quoted prices shall be **inclusive of GST**. GST as applicable shall be payable by contractor & the same will be reimbursed as per annexure - GST.
- c. In addition to existing taxes, any new taxes imposed by Central/ State Govt. shall be payable by the contractor and same shall be reimbursed on submission of relevant documents/proof of payment.
- d. Any new tax is imposed by Central/ State Govt. or there is any variation in taxes after expiry of delivery / contract period, the same shall be borne by contractor only.
- e. All terms & conditions of the contract in respect of taxes & duties are subject to new taxation laws introduced time to time by Govt. and terms & conditions will deemed to be modified in accordance with the provisions of New Laws (i.e., GST).
- f. **The quoted prices shall be fixed & firm without any escalation during the entire period of contract and till completion of the work.**
- g. **BOCW CESS applicable @ 1% on total work order value.**

21. RISK PURCHASE:

In case the contractor fails to execute the work due to any reason, BHEL reserves the right to get the same completed through some other party at the risk & cost of the contractor and any additional expenditure incurred due to the same shall be charged to the contractor.

22. REVERSE AUCTION

Reverse Auction will be conducted with the qualified bidders in GeM portal

23. GENERAL:**23.1 Bidders shall confirm their acceptance to all the terms & conditions of the tender enquiry.**

Deviations to the tender conditions are not acceptable and BHEL-HPVP reserves the right to reject such offers which do not meet Technical / Commercial requirements without any / further correspondence.

23.2 BHEL reserves the right to modify or cancel or short close the tender at any stage at its discretion without assigning any reason thereof.

23.3 The bidders shall study the Tender documents and all other relevant documents in detail for understanding the scope of work involved in various items before submission of offers.

For any clarifications required on this tender document, scope of work etc., the bidders shall depute their authorized representatives to HPVP, Visakhapatnam with prior intimation to get clarifications from concerned authorities.

23.4 **Sr. Manager (E&C)** shall be the Site -in-charge for herein after referred to as such in the tender.

23.5 The following documents (enclosed) shall form part of the contract including this Notice Inviting Tender.

PART - I: TECHNO COMMERCIAL BID

1) Scope of Work, Special Terms & conditions	: Annexure – I
2) Technical Conditions & Specifications	: Annexure – II
3) General Conditions of the Contract (Works/Services)	: Annexure – III
4) Tools & Test Equipments	: Annexure – IV
5) Acceptance to the tender terms & conditions	: Annexure – V
6) Contractor Information	: Annexure – VI
7) Check List	: Annexure – VII

PART - II: PRICE BID

8) Price Bid (Schedule of Quantities and Rates)	: Annexure – VIII
9) Quality Plan ref: 6-82-5000 Rev 1	
10) GA Drawings	

24. TENDER SUBMISSION:

The tender completed in all respects **shall be submitted** in two parts through GeM Portal **latest by 14.00 Hrs. on 15.03.2024:**

Submission of offer by a tenderer implies that all the tender documents were read by the tenderer and the tenderer is aware of the scope and specifications of the work, site condition, local conditions and rates at which stores, tools and plant, free / chargeable materials etc., will be issued to him by BHEL - HPVP and other factors having bearing on the execution of the work.

25. OPENING OF TENDERS:

Bid will be opened on **15.03.2024 at 14.30 Hrs. in GeM portal.**

- 26. 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.

**Yours Faithfully,
For BHARAT HEAVY ELECTRICALS LIMITED,**

**(D Gowri Sankar)
Manager (OS)**

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SCOPE OF WORK , SPECIAL TERMS & CONDITIONS

The project is **Fired Heater** for M/s. **GAIL_Usar**. The job involves Erection, Testing, Calibration, Loop Checking and Commissioning of field and control instruments comprising of PLC panel, etc., and package instruments with associated erection hardware.

BHEL will supply all the field and control room instruments, local panels, package instruments (in installed condition unless otherwise specified) as applicable & its associated erection hardware. The list of Instruments & Structural steel is covered in 'Schedule of Quantities & Rates' enclosed as Annexure – IV.

The distance between **Fired Heater** to Control room will be approximately 250 meters. Cables between Field and control room will be laid in duct /cable Trays or in existing cable trenches. Inside/outside Purge Gas Recovery Unit battery limit Aluminium cable trays will be used.

In case of any conflict between any clauses of the documents enclosed with the tender, generally more stringent requirement shall be met by the contractor as per instruction of Site Engineer.

2 SCOPE OF WORK FOR INSTRUMENTATION CONTRACTOR:-

The instrumentation contractor shall study the site & satisfy himself that he will be able to take up the work as per the site conditions and complete the work in all respect as per the time schedule given in the contract. The instrumentation contractor shall carry out works as per unit rates for items covered in 'Schedule of Quantities & Rates' under Annexure-IV. The contractor shall supply manpower during commissioning for trouble shooting of plant with all necessary tools, tackles and consumables.

Instrumentation job activity involves Erection, Testing, Calibration, Open / Close Loop Checking & Commissioning of field & control room Instruments as given elsewhere.

2.1 Receipt of all instruments / Erection hardware such as fittings, pipes, tubes, air headers, cables, cable trays etc., panels, structural material and erection hardware etc., from BHEL stores / office from time to time according to the plan of work and their storage in the safe custody for carrying out the work.

2.2 Erection, Calibration, Testing, Loop checking & Commissioning of field instruments as applicable as per the items listed in Annexure-IV. Contractor to submit calibration report & loop check report for these instruments duly signed by **BHEL /GAIL**.

2.3 Laying, Glanding, clamping, tagging & termination of cables as required.

2.4 Wherever applicable as per SOQ, Installation of Impulse piping/tubing for Instruments as per Hookup drawings & 6mm OD / 1/4" OD SS/CU tubing for Air supply from air distribution pot/Lines to instruments, Blowing & pneumatic Testing of above are in contractor's scope.

2.5 Minor civil works such as grouting for instruments supports, wall openings for routing cable wherever applicable is in contractor's scope.

2.5.1 Arrangement for scaffolding shall be in the scope of contractor (along with material) wherever necessary. GA Drawings have been attached along for vendors reference.

2.6 Contractor shall perform earthing of LCP / Terminal box, JB & Field instruments to nearest earth grid. Necessary earthing material supply & installation is in the scope of contractor.

2.7 PAINTING: - Painting of all the structural steels such as MS angles, Channels, Plates, 2" ERW pipes, sheets etc., wherever specified in the contract document (Annexure-IV). Scope includes supply of Paints as required and shall be painted as per Sl. No.4.9 of Annexure-II Technical conditions and specifications for erection and commissioning works of Instrumentation. Shot Blasting /Sand Blasting is in the scope of vendor for erection materials wherever applicable.

(Note: Color of paint will be indicated by site engineer during execution). For painting, environment shall be considered as highly corrosive. The primer used shall be having the properties of rust converter.

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2.8 Instrumentation contractor shall supply Lugs, Ferrules, Insulation tapes, dressing belts, clamps and Fasteners and Tag plates, anchor fasteners, U clamps, Bolts, nuts, grouting materials etc. required for completing the installation / erection of panels JB's / cable trays / cable ducts / CS impulse pipes / SS tubes / air lines / copper tubes / air headers etc. as applicable.

2.9 Contractor shall carry out modification / rectification work if any, liquidating all checklist points given by BHEL / GAIL which may arise during execution of instrumentation work. Contractor to attend all checklist points to the satisfaction of BHEL /GAIL Engineers.

2.10. The contractor shall comply with all standing procedure, rules and regulations that may come into effect during execution of instrumentation work. Further as a minimum, contractor has to comply with the following. Security gate pass for workmen & Staff.

2.10.1

2.10.2 Safety regulation i.e., to provide safety shoes, safety helmets, safety gloves, safety belts etc. to their workmen and to comply the safety norms.

2.10.3 Work permits such as Hot & Cold permits time to time from customer.

2.11 Contractor shall have all necessary Calibrating /Testing equipment's for calibration of Instruments with test certificate from standard approved labs. This calibrating equipment shall be of GAIL approved make.

2.12 Date of commencement of contract period will be from the date of site mobilization by Instrumentation Contractor.

Site mobilization shall meet the following as minimum requirement.

1. Identifying contractor's site In charge.
2. Establishing site office in all respects for day to day work requirement.
3. Shifting of tools & Test equipment's to site office.
4. Mobilization manpower to site.

2.13 Contractor shall engage technical manpower during commissioning period in all the 3 shifts as per BHEL Requirement. However, contractor must put up all efforts to complete the work by increasing manpower with required tools, Tackles, resources as per BHEL time schedule with their client & as per site requirements.

2.14 Radiography, post weld heat treatment (PWHT) and stress relieving shall be carried out, as required as per Piping Material Specification. Contractor to take precaution with respect to welding and PWHT of valve ends so that the valve internals are not damaged.

2.15 After installation of instrument, seal welding shall be provided as per instruction of purchaser at site in addition to the requirement of piping material specification.

Instruments in gas service are to be installed only above or at least parallel to the tapping with the slope in the impulse piping towards the tapping to achieve self-draining

SIGNATURE OF TENDERER WITH SEAL

TECHNICAL CONDITIONS & SPECIFICATIONS FOR ERECTION & COMMISSIONING WORKS OF INSTRUMENTATION

1.0	The document covers in general standards, specifications of work technical requirements to be met by the contractor for the execution of instrumentation works and criteria of scrap and excess materials. The contractor shall execute the works in accordance with these technical conditions and various other drawings, schedules, documents supplied along with tender / work order/ contract and time to time instructions issued by BHEL during the execution of work or progress of the work. It is made clear that contractor means instrument contractor.
2.0	STANDARDS:- The instrumentation erection and calibration works shall be carried out by the contractor as per sound engineering practice in accordance with International and Indian standards in instrumentation listed below but not limited to the following. a) AP1-RP-550 Manual on installation of refinery instruments and control system. b) BS-6739 instrumentation in process control systems, installation design and practice. c) ISA standards and practice in instrumentation. d) Instrumentation hookup drawings (installation drawings), cable schedules, wiring drawings, etc., e) Manufacturer's standards, practices, drawings, recommendations, instruction manuals etc.
3.0	The following are inclusive of instrumentation contractor's scope of work.
3.1	Fabrication of pipe nipples, including threading as per requirement.
3.2	Filling of seal pots with filling liquids as per instructions/requirements.
3.3	Back / seal welding of screwed fittings as required by standards or as per instructions.
3.4	Civil works including casting of foundations as per requirement, for instrument supports where paved surface do not exist.
3.5	Minor civil works like chipping of pavement and grouting the instruments panels supports/stanchions and chipping and refilling of the pavement for conduits, marking cable entries on the wall of concrete roofs and making them good after the works.
3.6	Sealing of the cables /tube entries with the control room after laying and testing of all tubes, cables etc., by sealing compound supply of the sealing compounds is in the scope of the contractor.
3.7	Degreasing the handwheels of control valve /dampers, oxygen service impulse lines, instruments and other items whenever required as per manufacturer's instructions or as required by Incharge engineer.
3.8	Rotation of control valve /dampers bonnet whenever required.
3.9	Reversing the action of control valve /dampers either by relocation of springs, accessories or in positioner whenever required.

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3.10	Modification / repairs wherever required to be done on the instruments such as changing the dial or glass for pressure gauges, temperature gauges and other instruments, replacement of rotameter tubes, level gauge glasses, (boiler drum level gauges are excluded), tapping of damaged threading's of fittings, cleaning of relays, nozzles in pneumatic instruments etc.
3.11	Painting of structural supports for trays, pipes, junction boxes, instruments, ducts, etc., as per painting specifications. Sand Blasting / Shot blasting shall be performed by vendor wherever applicable before painting.
3.12	Co- ordination during installation / pre-commissioning / commissioning, with mechanical contractors and other agencies during installation of line / vessel / equipment mounted instruments, such as control valve /dampers, Venturi Assembly, etc. This may involve removal of instruments, disconnection of tubes / cables/ reconnection for alignment and proper installation etc.
3.13	Drilling of holes on all panels, DCS/PLC panels, shut down cabinets, power supply cabinets, control panels, pneumatic enclosures etc., for cables /multi tube bundles /glands/ grommets.
3.14	Supply of all types of consumables, sealing compounds, etc., required for the execution of the job.
3.15	Grounding of shielded cables to respective instrument earth bus in the control panel/ local panel/ instrument etc.
3.16	Liquidating all check list points and obtaining certification for the same.
3.17	Submission of weekly statements for the materials received and consumed / erected for cables and piping material fittings.
3.18	Any other work not mentioned above but required for the proper execution of the works.
3.19	Preparation and submission of As-built drawings as required.
3.20	Providing pre- commissioning, startup and commissioning assistance as required.
3.21	Submission of final material reconciliation statement of all material received, erected/consumed and returned.
3.22	Scaffolding shall be arranged by the vendor (along with material), wherever envisaged, in carrying out the works as per the SOQ. GA Drawings have been attached along for vendors reference
4.0	<u>DESCRIPTION OF WORK:</u>
4.2	<u>TUBING:</u>
4.2.1	SS tubes shall be laid as per standards. The width of the tray shall be selected as per the no of tubes to be laid. Tubes shall be clamped to the trays at every 300 mm using clamps made of aluminum strips or GI. The practice of flattening the tubes for clamping purposes shall not be permitted. Open ends shall be covered to prevent ingress of moistures, dust, vermin etc. Such covers, plugs shall be removed only when final connections are made.

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4.2.2	Trays shall be supported either from any rigid steel structure or concrete member as detailed under trays and supports below.
4.2.3	All male / female tube connectors shall be installed with Teflon tape only. Identification tag plates / ferrules shall be provided at both ends of the tubing. Ferrules shall be single sleeve type with letters and numbers neatly printed.
4.2.4	Where ever required, SS tubes shall be cut using only pipe cutting devices such as tube cutter or hacksaw. Hot cutting will not be allowed. Tube cutters or hacksaws should always be sharp and cutting shall be done at uniform cutting rate. Trying to get deep cut with each turn of the tube cutter or with each back and forth motion of the saw blade should be avoided.
4.2.5	While using compression fittings, tubing ends should be deburred. This will allow more easy entrance of the tube into the bore of compression fitting and will pass through the ferrules without damaging the sealing edge of the ferrules.
4.2.6	SS tubes shall be bent using tube bender only and any hot bending will not be accepted.
4.3	<u>CABLES:</u>
4.3.1	Multicore cables / multitube bundles shall be installed on ducts / trays and properly clamped. At every vertical drop to junction boxes, they shall be clamped at more frequent intervals (max. 300 mm). They shall be connected inside junction boxes strictly as per the number system as mentioned in the cable schedule. At bends, minimum radius shall be maintained as per manufacturer's recommendation. The angle tray supports shall be fabricated from 50 mm X 50 mm X 6 mm MS angles.
4.3.2	Identification tags shall be provided on either end of the multicore cables as per cable schedule. Engraved SS or Aluminium tag plates shall be provided by the contractor for the identification of multicore cables. PVC ferrules shall be provided by the contractor for the identification of the core of the cable. The tag plates shall be bound to the cables with SS /GI wire.
4.3.3	All cables shall be cut after the exact site measurements are taken between the ends and tube / cable drums selected before cutting lengths so as to avoid any wastage. The length of the cable shall have sufficient amount on both ends for final connection of the cable to the terminals on both ends.
4.3.4	All multicore cables and multitube bundles laid in trays shall be properly dressed and tied with nylon wires of 3 mm diameter and shall be clamped with GI clamps or aluminum strips / clamps at intervals of 600 mm.
4.3.5	In the field, the cables shall be laid in trays or ducts as per layout drawings. Wherever required cable shall also be buried under-ground or taken in concrete trenches as per requirement. Inside control room, cable shall be laid in concrete trenches or below false flooring.
4.4	<u>INSTALLATION OF INSTRUMENTS:</u>
4.4.1	All instruments shall be generally installed on supports as per installation standards / installation drawings in each case and shall be accessible.

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4.4.2	Air filter regulators shall be mounted on the instrument itself below the instrument or on the control valve /dampers yoke.
4.4.3	All supports shall be fabricated by the contractor.
4.5	<u>INSTRUMENT AIR SUPPLY:</u>
4.5.1	Instrumentation contractor has to do the main instrument line supply header in each area unless otherwise specified. Main instrument air supply header will be generally GI. In certain specific cases, SS pipe is also foreseen. The main instrument air supply is to be connected to the air sub header. Generally, the air line from take off valve on the air sub header to individual instrument will be 1/4" SS tube. In certain specific cases such as, purging line to control panel, airline to damper etc., the air line from the main instrument header will be pipe or tube as per requirement.
4.6	<u>Cable Trays / Ducts / Perforated Trays / Angle Trays and Supports:</u>
4.6.1	Main instrument cable trays will be generally galvanised iron perforated cable trays or MS cable ducts. Ladder type cable trays made out of MS angles may also be used depending on the project /site requirement. In certain cases, FRP cable trays or aluminum perforated cable trays are also foreseen. GI perforated cables will be normally in sections of 2.5 meters long. Cable ducts will be as per drawings and normally in sections of 2.5 meters long. The main cable trays / ducts shall be laid as per lay out. In case of MS cable ducts, the installation and welding etc., of partition plates should also be carried out by the contractor wherever required. Structural steel supports for the cable trays / ducts are to be provided by the contractor. Wherever such structural supports are already existing or provided by the agencies, same shall be made use of. However, additional structural supports, as required should be provided by the contractor.
4.6.2	Supports for the GI perforated cable trays / MS angle trays shall be provided by the contractor. The supports shall be provided at intervals of 1.5 M (maximum) and the supports shall be welded to the insert plates or steel structures. Where insert plates are not available, supports shall be fixed to the concrete structures with minimum 10mm dia. expansion bolts (anchor fasteners). Angle supports for perforated trays; MS angle trays shall be fabricated out of minimum 50 mm X 6 mm MS angle.
4.6.3	All supports shall be cut with hacksaw. Employing gas cutting for cutting and making holes is not acceptable. Free ends of angles support shall not have sharp edges and all sharp edges shall be properly rounded off.
4.6.4	Perforated GI trays and or MS angle trays shall be used for all branch cable / tube ways from main trays. Width of the tray shall be selected according to the number of tubes and cables. These branch trays shall be laid by the contractor as per site conditions and site requirements with the approval of Resident Manager / Incharge Engineer of BHEL. Contractor should provide adequate supports for all branch trays.
4.6.5	Fabrication of bends or tees for GI perforated trays, MS angle trays and cable ducts as per site requirement is in the scope of contractor. However where pre-fabricated bends, tees are supplied, the same may be used.

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4.6.6	Main cable ducts, fabricated ladder type angles trays, perforated trays and their supports shall be painted as per painting specifications detailed below.
4.7	<u>Laying of Cables:</u>
4.7.1	Contractor shall lay all cables in accordance with installation drawings and cable schedules. Before laying, the cables / multicables on drums shall be meggered and tested to ensure there are no transit damages.
4.7.2	All cables routes shall be carefully measured and cables cut to the required lengths, leaving sufficient lengths for the final connection of the cable to the terminals on both ends. The various cable lengths cut from reels / drums shall be carefully selected to prevent undue wastage of cables. Sufficient extra length of cable shall be kept at the termination points.
4.7.3	A detailed planning should be made by the contractor, in consultation with BHEL Engineer, before laying the cables, giving the drum number, cable number, lengths etc.,
4.7.4	Each cable length shall have a complete uncut length from one termination to another.
4.7.5	All cable shall be identified close to their termination point by cable numbers as per cable schedules / junction box schedules. PVC ferrules and tag plates shall be provided by contractor and their identification tags shall be securely fastened to the cables.
4.7.6	Contractor should provide PVC ferrules (numbered and lettered ferrules as per requirement) for identification of each core of the cable laid. Core/ wire numbers shall be as per schedules. All temporary ends of cables shall be protected against dirt and moisture. For this purpose, ends of the cable shall be taped either PVC or rubber insulating tape.
4.7.7	The bending radius of cables shall be maintained as per manufacturer's recommendations. Cables installed above ground shall be run exposed on walls, ceilings, structures and shall run parallel or at right angles with beams, walls or columns.
4.7.8	Contractor should rigidly clamp all cables individually or group wise to the respective trays / ducts / support by GI clamps / Aluminum flats / or multiple cable supports or cable trays. Supply of such Gi clamps / Aluminum flats with necessary Gi bolts, nuts and washers is in the scope of contractor. Where drilling of any structural steel is to be resorted, it shall be ensured that any weakening of the structure is minimum clamping of the cables shall be done by the contractor at intervals of 500 mm for vertical runs and 1000 mm for horizontal runs.
4.7.9	All special cables and power supply cables shall be laid direct to the field instruments without any junction box, unless otherwise specified.
4.7.10	While laying the cables in ducts / trenches or burying them, care shall be taken to ensure that low signal cables such as alarms, analyzer cables, special cables from turbine meters, other special cables, compensating cables, etc., are separated from other power supply cables.
4.7.11	<u>Underground Cables:</u> Each underground Cable (either in concrete trenches or buried) shall be provided with identifying tag of lead securely fastened at every 30 M of its underground length with at least one tag at each end before the cable leaves or enters the ground.

4.7.12	<u>Buried Cables:</u> Directly buried cables shall be laid underground in excavated cable trench wherever specified in lay out drawings. Trenches shall have sufficient depth and width to accommodate all cables property spaced. Before cables are placed, the trench bottom shall be filled with 100 mm layer of sand and levelled. Each layer of cable shall be covered with 150 mm of sand on top and sand shall be lightly pressed. A protective covering of 75 mm thick second-class red bricks shall be placed flat on the final layer of sand and cable. On completion of every group of cable laying and before sand filling, each cable should be tested for continuity and insulation tested in presence of BHEL engineer. Any cable found to be defective shall be replaced before next group of cables are laid. After the final layer of cable and bricks are laid the remaining portion of the trench shall be back filled with soil compacted and levelled. Cable route makers indicating the no. of cables, depth and direction shall be placed enroute, on cross-overs/turnings etc., to mark the cable route.
4.7.13	<u>Road Crossing for Underground Cables:</u> At each road crossing and other places, where cables enter pipe sleeves, adequate bed of sand shall be given so that the cables do not stack and get damaged by pipe ends after back filling. After laying the pipe sleeves shall be sealed using sealing compounds. At the entry into concrete blocks at road crossings, cable loops shall be provided at either ends to prevent any damage to the cables. Each cable shall have one tag at each end before the cable enters or leaves the pipe.
4.7.14	After laying all the cables and multitube bundles, the cable entry to the control room should be filled and sealed suitably.
4.7.15	On completion of the cable laying in concrete trenches, the trenches shall be filled with sand and precast concrete slabs shall be placed on the trench.
4.8	<u>Earthing:</u>
4.8.1	Earthing of junction boxes, local cabinets shall be carried out by the contractor as per documents and instructions from the Incharge Engineer.
4.9	<u>Painting: (Sand Blasting / Shot blasting shall be performed by vendor wherever applicable before painting.)</u>
4.9.1	This part of the specification is applicable to all structural steel, cable ducts, MS cable ways, MS angle trays, instrument supports, 2" NB MS pipe for stanchions, base plate of the MS pipe supports / stanchions, perforated trays, all structural steel supports for the above items, etc., This painting work including the supply of the primer, paint and arranging painting equipment and accessories are all included in the instrument contractor's scope.
4.9.2	The surface to be painted shall be thoroughly cleaned with wire brush and sand paper to remove all scales. After cleaning, the surface is to be painted with one coat of red-oxide zinc chromate primer conforming to IS-2074 and allowed to dry completely.
4.9.3	Primer coated surface is painted with one coat of paint to the color nearest to the final paint and allowed to dry. The color number shall be specified from IS-5.

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4.9.4	Final second coat shall be with the paint of desired colours and shall be selected form IS-5. The colour code from IS-5 shall be specified during contract stage or will be intimated at site.
4.9.5	It may be preferable that final second coating of external surfaces not covered by the cables, tubes etc., be applied just before completion of the project or handing over of the project whichever is earlier.
4.9.6	Contractor shall use primer and paints of reputed make only.
4.10	<u>Testing:</u>
4.10.1	Electrical cables for signal, alarm and power supply shall be checked for megger values and continuity before final termination and ferruling.
4.10.2	Testing shall be carried out after the installation of the instrument with primary piping completed in all respects and approved by Incharge Engineer.
4.10.3	Primary piping shall be tested hydraulically / pneumatically to 1.5 times the operating pressure after isolating the instrument. Flushing of piping shall be carried out as per instruction of Incharge Engineer. Lines shall be blown after hydrotesting. All external displacement / float type level instruments, level gauges shall also be tested as per Site Incharge/ Engineer.
4.10.4	Tubes and air lines shall be tested with compressed air to 7 kg/cm ² g up to the filter regulator. The downstream side of the filter regulator shall be tested to 1.5 kg/cm ² g. The lines shall be blown with instrument air up to the filter regulator for 15 minutes to remove any traces of oil, dust and moisture. All pneumatic lines shall be checked with soap solution and bubbler unit for possible leak at joints. After pressurizing, the source shall be isolated and the rate of fall in pressure shall be less than 1 PSI for each 100 feet for a test period of 2 minutes.
4.10.5	All test results shall be recorded in the approved format and shall be signed by contractor, BHEL and customer / consultant.
4.11	<u>Calibration:</u>
4.11.1	All the instruments shall be calibrated by the contractor strictly as per manufacturer's instructions prior to the installation. The scope of calibration work is as per schedule of quantities.
4.11.2	Contractor shall use his own oil free instrument air compressor for calibration purpose.
4.11.3	Conversion from one unit to another for the purpose of calibration is not allowed.
4.11.4	Procedure for calibration of different items is as below, however the detailed procedure shall be submitted by the contractor to the Incharge engineer for approval before proceeding with calibration.
4.11.6	All thermocouple receiver instruments shall be calibrated by generating millivolt signals suitable for span and type of the thermocouples used.
4.11.7	Receiver instruments shall be programmed calibrated and aligned using test hook up as per instruction from manufacturer or Incharge Engineer.

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4.11.14	The external displacer type level instruments shall be calibrated as per manufacturer's instructions or calibrated by filling the displacer chamber with water for level 0%, 25%, 75% & 100% of range and draining the water at 100%, 75%, 25%, 0% of ranges after applying suitable specific gravity connections of the process field as per data sheets.
4.11.15	The internal displacer/float type level instruments shall be dry calibrated as per manufacturer instructions or using calibration chamber calibrated out of steel pipes and filling the same with water.
4.11.16	The level switches (external cage type) shall be filling the cage with water to design alarm/trip level. While setting the switches it shall be ensured that the micro switches do not reset for full rated travel of the float.
4.11.17	Tank level indicator shall be calibrated by manually lifting the float at 0%, 25%, 75% & 100% and vice-versa of range.
4.11.18	control valve /dampers and positioners shall be checked for hysteresis and linearity and calibrated for rated strokes. Prior to calibration the valves shall be cleaned externally. The item is to be lubricated, where required (control valve /dampers for oxygen service should not be lubricated) and stroked few times to extreme positions of plug to ensure that movement is free from friction. The valve shall then be calibrated for rated stroke and linearity. Subsequently the valve shall be checked for hysteresis. Stroke speed has to be evaluated for trip / shut down valves.
4.11.19	All calibration readings shall be recorded in the approved format and submitted to the Incharge Engineer. All such calibration and test records shall be signed by contractor, BHEL and customer / consultant.
4.11.20	A list of recommended calibration and test equipment required as a minimum for calibration is furnished below. The contractor shall clearly state in his offer the complete list of calibration and test equipment along with range, accuracy and quantity which he proposes to use for this job. Contractor should also ensure that any equipment not listed below but required at the time of calibration shall be made available at his own cost.
4.11.21	All test equipment and kits shall be approved by NPL/IDEMI/ERTL authorities. Copy of the test certificates to be furnished.
4.11.21.4	Oil bath for temperature calibrations -max. temp. 350 deg.C
4.11.21.5	Standard mercury in glass thermometers of ranges: -50 to+50 deg. C, 0 to 100 deg. C, 0 to 250deg. C, Accuracy: $\pm 0.25\%$
4.11.21.8	Decade resistance box.
4.11.21.9	Multimeters-Accuracy: ± 0.05 mv.
4.11.21.10	Potentiometer / direct digital calibrator (capable of generating and measuring mV).

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4.11.21.11	Meggers 500 V/1100V
4.11.21.12	Air Hydro pump/Hydraulic pump
4.11.21.13	Vacuum pump
4.11.21.15	Current generator (instrument calibrator) 4-20 mA DC (Rosemount or equivalent) with power source.
4.12	<u>LOOP TEST:</u>
4.12.1	Loop test shall be performed after calibration of all instruments and leak testing of signal lines. Loop test shall be conducted to check performance of the loop, thereby ensuring proper connections and operations.
4.12.2	Generally, loop testing shall be conducted when installation, hydro testing of impulse lines of the instrument, calibration of the instrument etc., are completed. However, depending on site requirement, time schedules of the project, loop test can be carried out as a parallel activity. For example, flow measurement loop with a D.P transmitter is ready except that the impulse lines (primary piping) is not hydro tested. In such case, the hydro testing and loop testing can be carried out as parallel activities.
4.12.3	Few examples of loop test are outlined below.
4.12.4	Example 1 : Loop test of a flow measurement (monitoring) loop. Data : The flow measurement loop consists of Orifice plate assembly, Electronic D.P transmitter, Single pair cable , Field Junction box, Multipair cable and Receiver Indicator in the control room. Pre Requisites : Installation of Orifice plate assembly, Installation of the D.P transmitter, Installation of primary piping, Installation of junction box, Installation of receiver indicator in the control room , Installation and termination of multipair cables, Hydro testing of the impulse lines, continuity checking of the cables , calibration of D.P Transmitter, calibration of receiver indicator. <u>LOOP TEST :</u> - Electrically disconnect the D.P Transmitter and the receiver indicator. - Disconnect the leads of the single pair cable inside J.B. - Connect 4-20 mA DC to the open leads of the single pair cable (transmitter end) and measure the output at the other end of the open leads of single pair cable (J.B. end). Output shall match with input for 0%, 25%, 75% & 100% of the signal. -Similarly connect 4-20 mA DC signal to the open leads of multi pair cable (JB end) and measure the output at the corresponding other end of multi core cable (Receiver instrument end). Output shall match with input for 0%, 25%, 75% & 100% of the signal. -Now connect single pair cable leads and the leads of multi pair cable into terminals of JB. Connect 4-20 mA DC signal to the open leads of single pair cable (D.P Transmitter end) and measure the output at the open leads of multi core cable (Receiver instrument end). Output shall match with input for 0%, 25%, 75% & 100% of the signal. Now connect the open leads of multi pair cable to the receiver indicator. Follow the manufacturer's instructions and switch on power supply to receiver indicator. Now, ensure Rosemount make field calibrator is not in powering mode i.e., it will act as a variable resistor and as a read out of mA DC. Since, the receiver indicator provides the power, caution is necessary not to power again A multimeter and 1K potentiometer can also be used in place of Rosemount make field calibrator for this purpose. Signal input at single pair cable (Transmitter end) should match with the output at the receiver instrument for the 0%, 25%, 75% & 100% of signal.- Now, connect the open leads of single pair cable to the D.P Transmitter.-Record the loop test in the appropriate format and should be signed by the contractor, BHEL and customer / consultant.

4.12.5	Example 2: Loop test of a pressure control Loop : Data : The pressure control loop consists of Electronic Pressure Transmitter , Single pair cable , Field Junction box, Multipair cable , Receiver controller in the control room, Multipair cable , Junction box, Single pair cable , I/P converter Pneumatic signal and control valve /dampers. Pre Requisites : Installation of Electronic Pressure Transmitter , Primary piping to the transmitter, Junction box, Single pair and Multipair cable , Electronic receiver controller in the control room, control valve /dampers, Pneumatic tubing, Instrument air supply, Completion of Hydro testing of impulse lines, Leak testing of pneumatic lines , Continuity checking of cables, Calibration of pressure transmitter, Calibration of controller (including direct or reverse acting) and calibration of control valve /dampers. LOOP TEST : - As outlined in Example 1, ensure that the loop from single pair cable to controller is OK. -Similarly , establish that the loop from the controller to control valve /dampers is OK. -Record the loop test in the appropriate format and should be signed by the contractor, BHEL and customer / consultant.
4.12.6	In case of shut down system Field / receiver Pressure switches, the abnormality is simulated by disconnecting the leads or shorting the leads at the terminals and function of all associated systems are checked.
4.12.7	Any defects observed during Loop test, shall be rectified by the contractor.
4.12.8	After the completion of Loop test, the contractor shall connect back any terminations and connections.
4.12.9	In case of loops in which certain instruments of the loop are calibrated by other agency, Loop testing shall be performed on co-ordination with the agency involved.
4.12.10	In case, control room instrumentation is not included in BHEL scope, and assistance in loop testing is included, Contractor shall furnish such assistance for loop testing and contractor shall abide by the instructions of Incharge Engineer of BHEL.
4.12.11	In case DCS is included in BHEL scope, the procedure and scope of loop checking shall be as detailed below for the loops connected to the Distributed Control system. The contractor's scope include but not limited to the following, -Laying the cables, identifying all cables and cores dressing the cables inside the control room. - Calibration of all field instruments independently. -Measuring signal level of field instruments output at control room for the respective of identified cores. - Co-ordination with DCS vendor during loop checking. - Assistance to DCS vendor during loop checking. - Rectification / recalibration of field instruments if found defective during loop checking. However, checking of the inter connection between the instruments / equipment inside the control room, ferruling / tapping of inter connecting cables inside the control room and performing loop checking from DCS shall be by DCS Vendor.

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5.0	<u>DRAWINGS AND DOCUMENTS TO BE SUPPLIED BY BHEL TO THE CONTRACTOR FOR EXECUTION OF WORKS:</u>
5.1	Cable schedules for alarm /signal / shutdown / power supply cables.
5.2	Termination details / drawings for connecting at control room end.
5.3	Individual Instrument specifications.
5.4	Bill of materials.
5.5	Installation standards / Hookup drawings.
5.6	Manufacturer's instruction manual for installation or calibration where required for reference.
6.0	<u>DRAWINGS AND DOCUMENTS TO BE SUPPLIED BY THE CONTRACTOR</u>
6.1	<u>AS BUILT DRAWINGS:</u> Two sets of layout drawings, instrument schedules, bill of materials, cable schedule etc., duly incorporating the changes / modifications carried out during the execution of works. The drawings / documents will be provided by BHEL to the contractor for this purpose and contractor shall prepare the As - built drawings as explained above.
6.2	Final material appropriation statement for all the free issued materials, indicating shortage, if any, in the appropriate format duly approved by the Incharge Engineer.
6.3	Return of all drawings and manufacturer's instruction manuals given by BHEL to contractor for reference.
7.0	<u>MATERIALS TO BE SUPPLIED BY BHEL TO CONTRACTOR AS FREE OF COST FOR EXECUTION OF WORKS</u>
7.1	All pipes, tubes, and piping materials such as valves, flanges, gaskets, bolts & nuts for flanges necessary for primary piping, air supply.
7.2	Tubes and Tube fittings.
7.3	All pneumatic, electronic instruments, pressure gauges, resistance thermometers, temperature gauges, thermowells and accessories like switches, air filter regulators, solenoid valves, etc.,.
7.4	Electronic Junction boxes for field mounting.
7.5	Two core / Three core / Multi core shielded cables for low signal alarm, single pair, multipair thermocouples extension cables and three core and multicore resistance thermometer cables.
7.6	Cable Glands and Fittings.
7.7	Local Panels.
7.8	Cable ducts / cable trays.
8.0	<u>MATERIALS TO BE SUPPLIED BY CONTRACTOR AT HIS OWN COST AS PART OF THIS SPECIFICATION /ANNEXURE</u>

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8.1	The procurement and supply in sequence and at the appropriate time of all materials and consumables except for the materials specifically listed under BHEL scope of supply, shall be entirely the contractor's responsibility and his rates for execution shall be inclusive of all these items. They are as follow but not limited to the following.									
8.2	All industrials gases like oxygen, acetylene or inert gases, compressed air and all types of electrodes, brazing rods, flux etc., for welding purposes, with necessary facilities for testing the welded joints.									
8.3	Teflon tape and other pipe jointing compounds for threads and material for sealing of cable entries to control room, local panels, insulation tapes, sealing compounds for explosion proof conduit fittings etc.,									
8.4	Bolts, nuts and washers for supports, U bolts with nuts & washers, clamps for tubes and pipes, anchor bolts for panels, expansion bolts (pinch anchor / raw bolts) of various sizes for fixing to the concrete structures, polythene bags for protection of instruments against rain , bolts & nuts for junction boxes, emergency shut down push button stations, on-off push station , power supply distribution boxes etc.,.									
8.5	Paints, Primers and solvents									
8.6	Plastic tags (ferrules) for identification of tubes/wires at panel junction boxes.									
8.7	All materials for minor civil works like grouting etc..									
8.8	All accessories for electrical wiring like cable lugs, ferrules for identification etc..									
8.9	Aluminium / Metallic tag plates for cables for identification. G.I clamps/aluminium strips with bolts, nuts and washers for clamping the cables.									
8.10	Cable route identification marker plates for buried cables.									
8.11	S.S wire for tag plates, G.I wire / Nylon tape /rope for clamping / tubing.									
8.12	Cleaning agents such as Rustolene petrol, Kerosene etc., Wherever required.									
9.0	<u>SCRAP AND EXCESS MATERIALS</u>									
9.1	Every month the contractor shall submit and account for all the materials issued to him by BHEL in a standard proforma described for this purpose by the Incharge Engineer.									
9.2	On completion of work, the contractor shall submit materials appropriation statement for all the materials issued by BHEL in the proforma given by Incharge Engineer.									
9.3	<table><tr><td>The following scrap allowances are permissible,</td><td>Non salvageable</td><td>Unaccountable</td></tr><tr><td>Steel pipes, SS tubes, Single pair/ Two core, Three core, Multicore cable, Structural steel.</td><td>2%</td><td>0.5%</td></tr><tr><td colspan="3">(Note: Non-salvageable scrap shall mean the lengths of the tubes, pipes, multi cables, cables etc., and they are from cut piece of tubes, pipes, multi cables, cables, etc., that cannot be used.)</td></tr></table>	The following scrap allowances are permissible,	Non salvageable	Unaccountable	Steel pipes, SS tubes, Single pair/ Two core, Three core, Multicore cable, Structural steel.	2%	0.5%	(Note: Non-salvageable scrap shall mean the lengths of the tubes, pipes, multi cables, cables etc., and they are from cut piece of tubes, pipes, multi cables, cables, etc., that cannot be used.)		
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(Note: Non-salvageable scrap shall mean the lengths of the tubes, pipes, multi cables, cables etc., and they are from cut piece of tubes, pipes, multi cables, cables, etc., that cannot be used.)										

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9.4	All excess materials and scrap shall be returned by the contractor after duly accounting for, to the storage points designated by BHEL, where materials are to be weighed before returned, the contractor shall make necessary arrangements for weighing etc., The contractor shall not use the scrap sections for fabricating temporary supports or other items without the permission of the Resident Engineer/Resident Manager of BHEL.
9.5	If the contractor fails to return surplus materials, then recovery shall be made from the contractor's bills.

SIGNATURE OF TENDERER WITH SEAL

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CHAPTER -1

GENERAL INSTRUCTION TO TENDERERS

1.1. DESPATCH_INSTRUCTION:

- i) The General Conditions of Contract form part of the Tender specifications. **All pages of the tender documents shall be duly signed, stamped and submitted along with the offer in token of complete acceptance thereof.** The information furnished shall be complete by itself. The tenderer is required to furnish all the details and other documents as required in the following pages.
- ii) Tenderers are advised to study all the tender documents carefully. Any submission of tender by the tenderer shall be deemed to have been done after careful study and examination of the tender documents and with the full understanding of the implications thereof. Should the tenderers have any doubt about the meaning of any portion of the Tender Specification or find discrepancies or omissions in the drawings or the tender documents issued are incomplete or shall require clarification on any of the technical aspect, the scope of work etc., they shall at once, contact the authority inviting the tender well in time (so as not to affect last date of submission) for clarification before the submission of the tender. Tenderer's request for clarifications shall be with reference to Sections and Clause numbers given in the tender documents. The specifications and terms and conditions shall be deemed to have been accepted by the tenderer in his offer. Non compliance with any of the requirements and instructions of the tender enquiry may result in the rejection of the tender.
- iii) Integrity pact (IP) shall be applicable for all tenders / contracts if indicated in NIT. This integrity pact shall be issued as part of the Tender documents and shall be returned by the bidder along with Techno-commercial bid duly filled, signed and stamped by the authorized signatory who signs the bid. Only those vendors / bidders who have entered into such an IP with BHEL shall be considered qualified to participate in the bidding. Entering into this pact shall be a preliminary qualification

1.2. SUBMISSION OF TENDERS:

- 1.2.1 The tenderers must submit their tenders as per instructions in the NIT
- 1.2.2 Tenders submitted by post shall be sent by 'REGISTERED POST ACKNOWLEDGEMENT DUE / by COURIER' and shall be posted with due allowance for any postal/courier delays. BHEL takes no responsibility for delay, loss or non-receipt of tenders sent by post/courier. **The tenders received after the specified time of their submission are treated as 'Late Tenders' and shall not be considered under any circumstances.** Offers received by Fax/Email/Internet shall be considered as per terms of NIT.
- 1.2.3 Tenders shall be opened by authorised Officers of BHEL at the place, time and date as specified in the NIT, in the presence of such of those tenderers or their authorised representatives who may be present
- 1.2.4 Tenderers whose bids are found techno commercially qualified shall be informed the date and time of opening of the Price Bids and such Tenderers may depute their representatives to witness the opening of the price bids. BHEL's decision in this regard shall be final and binding.
- 1.2.5 Before submission of Offer, the tenderers are 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, means of transport and access to Site, accommodation, etc. No claim will be entertained later on the grounds of lack of knowledge of any of these conditions.

1.3. LANGUAGE:

- 1.3.1 The tenderer shall quote the rates in English language and international numerals. These rates shall be entered in figures as well as in words. For the purpose of the tenders, the metric system of units shall be used.
- 1.3.2 All entries in the tender shall either be typed or written legibly in ink. Erasing and over-writing is not permitted and may render such tenders liable for rejection. All cancellations and insertions shall be duly attested by the tenderer.

1.4 PRICE DISCREPANCY:

- 1.4.1 **Conventional (Manual) Price Bid opening:** In the case of price bid opening without resorting to Reverse Auction, if there are differences between the rates given by the tenderer in words and figures or in amount worked out by him, the following procedure for evaluation and award shall be followed:
 - i) When there is a difference between the rates in figures and in words, the rates which corresponds to the amounts worked out by the contractor, shall be taken as correct
 - ii) When the amount of an item is not worked out by the contractor or it does not correspond with the rate written either in figure or in words, then the rate quoted by the contractor in words shall be taken as correct
 - iii) When the rate quoted by the contractor in figures and words tallies but the amount is not worked out correctly, the rate quoted by the contractor shall be taken as correct and not the amount.

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- iv) In case of lump sum price, if there is any difference between the amount in figures and in words, the amount quoted by the bidder in words shall be taken as correct.
- v) In case of omission in quoting any rate for one or more items, the evaluation shall be done considering the highest quoted rate obtained against the respective items by other tenderers for the subject tender. If the tenderer becomes L-1, the notional rates for the omission items shall be the lowest rates quoted for the respective items by the other tenderers against the respective omission items for the subject job and the 'Total quoted price (loaded for omissions)' shall be arrived at. However, the overall price remaining the same as quoted originally, the rates for all the items in the 'Total quoted price (loaded for omissions)' shall be reduced item wise in proportion to the ratio of 'Original' total price and the 'Total quoted price (loaded for omissions)'.
- vi) The 'Final Total Amount' shall be arrived at after considering the amounts worked out in line with 'i' to 'iv' above.
- 1.4.2 **Reverse Auction:** In case of Reverse Auction, the successful bidder shall undertake to execute the work as per overall price offered by him during the Reverse Auction process. In case of omission of rates, the procedure shall be as per 'Guidelines for Reverse Auction' enclosed.
- 1.5. **QUALIFICATION OF TENDERERS:**
- Only tenderers who have previous experience in the work of the nature and description detailed in the Notice Inviting Tender and/or tender specification are expected to quote for this work duly detailing their experience along with offer.
 - Offers from tenderers who do not have proven and established experience in the field shall not be considered
 - Offers from tenderers who are under suspension (banned) by any Unit/Region/Division of BHEL shall not be considered.
 - Offers from tenderers who do not comply with the latest guidelines of Ministry/Commissions of Govt. of India shall not be considered.
- 1.6. **EVALUATION OF BIDS:**
- Techno-commercial Bids submitted by the tenderer will be opened first and evaluated for fulfilling the Pre-Qualification criteria and other conditions in NIT/Tender documents, based on documentary evidences submitted along with the offer
 - In case the same qualifying experience is claimed by more than one agency, then the agency who has executed the work as per documentary evidence submitted shall only be qualified. Scope of qualifying work should be totally with the agency who has executed and in case it is only labour + consumables without T&P, then the responsibility of execution is assigned to the first agency and not to the agency who has executed only as labour supply contractor. Further, BHEL reserves the right to ask for further proofs including submission of TDS certificates for the said job
 - In case the qualifying experience is claimed by private organizations based on Work Order and completion certificates from another private organization, BHEL reserves the right to ask for further proofs including submission of TDS certificates for the said job
 - Assessing Bidder Capacity for executing the current tender shall be as per Notice Inviting Tender
 - Price Bids of shortlisted bidders shall only be opened either through the conventional price bid opening or through electronic Reverse Auction, at the discretion of BHEL
 - Price Bids of unqualified bidders shall not be opened. After release of Letter of Intent / Work Order, the un-opened bids (including price bids) shall be returned to respective bidder along with reasons for not opening the bid.
- 1.7. **DATA TO BE ENCLOSED:**
- Full information shall be given by the tenderer in respect of the following. Non-submission of this information may lead to rejection of the offer.
- INCOME TAX PERMANENT ACCOUNT NUMBER**
Certified copies of Permanent Account Numbers as allotted by Income Tax Department for the Company/Firm/Individual Partners, etc. shall be furnished along with tender.
 - GSTIN REGISTRATION NUMBER**
Certified copies of GSTIN Numbers for the Company/Firm/Individual Partners, etc. shall be furnished along with tender
 - ORGANIZATION CHART**
The organization chart of the tenderer's organization, including the names, addresses and contact information of the Directors/Partners shall be furnished along with the offer.
An attested copy of the Power of Attorney, in case the tender is signed by an individual other than the sole proprietor
 - IN CASE OF INDIVIDUAL TENDERER:**
His / her full name, address and place & nature of business.

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v) **IN CASE OF PARTNERSHIP FIRM**

The names 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.

vi) **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 Association are also to be furnished).
- Nature of business carried on by the Company and the provisions of the Memorandum relating thereof.

1.8. AUTHORISATION AND ATTESTATION:

Tenders shall be signed by a person duly authorized/empowered to do so. An attested copy of the Power of Attorney, in case the tender is signed by an individual other than the sole proprietor shall be submitted along with the tenders

1.9. EARNEST MONEY DEPOSIT:

Not Applicable

1.10. SECURITY DEPOSIT / PERFORMANCE SECURITY:

- Security deposit means the security provided by the contractor towards fulfilment of any obligations in terms of the provisions of the contract.
- The total amount of the security deposit will be **5 %** of the contract value.

C. Modes of Deposit:

The required amount of Security Deposit of **5%** of the contract value may be accepted in the following forms:

- Cash (as permissible under the extant Income Tax Act)
- Local Cheques of Scheduled Banks (subject to realization)/ Pay Order/ Demand Draft/ Electronic Fund Transfer in favour of BHEL.
- Bank Guarantee from Scheduled Banks/ Public Financial Institutions as defined in the company's act. The bank guarantee format should have the approval of BHEL.
- Fixed Deposit Receipt issued by Scheduled Banks/ Public Financial Institutions as defined in the company's act (FDR should be in the name of the contractor, a/c BHEL.
- 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)
(**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)
- Insurance Surety Bonds

D. Collection of Security deposit:

At least 50% of the required Security Deposit, including the EMD, should be collected before start of the 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 total amount of the required Security Deposit is collected.

In case of delay in submission of performance security, enhanced performance security which would include interest (Repo rate + 4%) for the delayed period, shall be submitted by the bidder.

If the value of work done at any time exceeds the contract value, the amount of Security Deposit shall be correspondingly enhanced and the additional Security Deposit shall be immediately deposited by the Contractor or recovered from payment/s due to the Contractor.

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, with the approval of the authority competent to award the work.

(**Note:** In case of (a) small value contracts not exceeding Rs. 20 lakhs or (b) 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).

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- E. Security deposit shall be released to the contractor upon fulfilment of contractual obligations as per the terms of the contract.
- F. The security deposit shall not carry any interest.
- G. Bidder agrees to submit performance security required for execution of the contract within the time period mentioned.**

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

1.10.2 BHEL reserves the right of forfeiture of Security Deposit in addition to other claims and penalties in the event of the Contractor's failure to fulfil any of the contractual obligations or in the event of termination of contract as per terms and conditions of contract. BHEL reserves the right to set off the Security Deposit against any claims of other contracts with BHEL.

1.11. RETURN OF SECURITY DEPOSIT:

Security Deposit shall be refunded/Bank Guarantee(s) released to the Contractor along with the 'Final Bill' after deducting all expenses/ other amounts due to BHEL under the contract / other contracts entered into with them by BHEL.

1.12. BANK GUARANTEE:

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

- Bank Guarantees shall be from Scheduled Banks/ Public Financial Institutions as recommended by BHEL time to time.
- The Bank Guarantees shall be as per prescribed formats of BHEL.
- It is the responsibility of the bidder to get the Bank Guarantees revalidated/extended for the required period (subject to a minimum period of six months), as per the advice of BHEL Engineer-in-Charge / Site Engineer / Construction Manager. BHEL shall not be liable for issue of any reminders regarding expiry of the Bank Guarantees.
- In case extension/further extensions of any Bank Guarantees are not required, the bidders shall ensure that the same is explicitly endorsed by the Engineer-in-Charge / Construction Manager and submitted to the BHEL Visakhapatnam.
- In case the Bank Guarantees are not extended before the expiry date, BHEL reserves the right to invoke the same by informing the concerned Bank in writing, without any advance notice/communication to the concerned bidder.
- Bidders to note that any corrections to Bank Guarantees shall be done by the issuing Bank, only through an amendment in an appropriate non judicial stamp paper.
- The Original Bank Guarantee shall be sent directly by the Bank to BHEL under Registered Post (Acknowledgement Due), addressed to the Finance Bills, BHEL, HPVP, Visakhapatnam – 530012

1.13. VALIDITY OF OFFER:

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

1.14. EXECUTION OF CONTRACT AGREEMENT:

The successful tenderer's responsibility under this contract commences from the date of issue of the Letter of Intent / Work Order by Bharat Heavy Electricals Limited. The Tenderer shall submit an unqualified acceptance to the Letter of Intent/Work order within the period stipulated therein.

The successful tenderer shall be required to execute an agreement in the prescribed form, with BHEL, within a reasonable time after the acceptance of the Letter of Intent/Work Order, and in any case before releasing the first running bill. The contract agreement shall be signed by a person duly authorized/empowered by the tenderer. The expenses for preparation of agreement document shall be borne by Contractor.

1.15. REJECTION OF TENDER AND OTHER CONDITIONS:

1.15.1 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:

- To reject any or all of the tenders.
- To split up the work amongst two or more tenderers as per NIT
- To award the work in part if specified in NIT

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d. In case of either of the contingencies stated in (b) and (c) above, the time for completion as stipulated in the tender shall be applicable.

- 1.15.2 Conditional tenders, unsolicited tenders, tender which are incomplete or not in the form specified or defective or have been materially altered or not in accordance with the tender conditions, specifications etc., are liable to be rejected.
- 1.15.3 Tenders are liable to be rejected in case of unsatisfactory performance of the tenderer with BHEL or tenderer under suspension (hold/banning /delisted) by any unit / region / division of BHEL or tenderers who do not comply with the latest guidelines of Ministry/Commissions of Govt. of India. BHEL reserves the right to reject a bidder in case it is observed that they are overloaded and may not be in a position to execute this job'. The decision of BHEL will be final in this regard.
- 1.15.4 If a tenderer who is a proprietor expires after the submission of his tender or after the acceptance of his tender, BHEL may at their discretion, cancel such tender. If a partner of a firm expires after the submission of tender or after the acceptance of the tender, BHEL may then cancel such tender at their discretion, unless the firm retains its character.
- 1.15.5 BHEL will not be bound by any Power of Attorney granted by changes in the composition of the firm made subsequent to the execution of the contract. They may, however, recognize such power of Attorney and changes after obtaining proper legal advice, the cost of which will be chargeable to the contractor concerned.
- 1.15.6 If the tenderer deliberately gives wrong information in his tender, BHEL reserves the right to reject such tender at any stage or to cancel the contract if awarded and forfeit the Earnest Money/Security Deposit/any other money due.
- 1.15.7 Canvassing in any form in connection with the tenders submitted by the Tenderer shall make his offer liable to rejection.
- 1.15.8 In case the Proprietor, Partner or Director of the Company/Firm submitting the Tender, has any relative or relation employed in BHEL, the authority inviting the Tender shall be informed of the fact as per specified format, along with the Offer. Failing to do so, BHEL may, at its sole discretion, reject the tender or cancel the contract and forfeit the Earnest Money/Security Deposit.
- 1.15.9 The successful tenderer should not sub-contract part or complete work detailed in the tender specification undertaken by him without written permission of BHEL's Construction Manager/Site-in-charge / Engineer-in-Charge. The tenderer is solely responsible to BHEL for the work awarded to him.
- 1.15.10 The Tender submitted by a techno commercially qualified tenderer shall become the property of BHEL who shall be under no obligation to return the same to the bidder. However unopened price bids and late tenders shall be returned to the bidders.
- 1.15.11 Unsolicited discount received after the due date and time of Bid Submission shall not be considered for evaluation. However, if the party who has submitted the unsolicited discount/rebate becomes the L-I party, then the awarded price i.e. contract value shall be worked out after considering the discount so offered.
- 1.15.12 BHEL shall not be liable for any expenses incurred by the bidder in the preparation of the tender irrespective of whether the tender is accepted or not.

1.16. EMD EXEMPTION FOR MSME VENDORS: Not Applicable

1.17. FRAUD PREVENTION POLICY:

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

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CHAPTER-II

2.1 DEFINITIONS:

In these general conditions of contract, the following terms shall have the meaning hereby assigned to them except where the context otherwise requires: -

- (a) The "CONTRACT" means the documents forming the tender and acceptance thereof together with all the documents referred to therein including General and Special conditions of contract, CPWD specifications Vol. I to VII as amended up to date and the drawings. All the documents as applicable taken together shall be deemed to form one contract and shall be complementary to one another.
- (b) The "TENDER DOCUMENT" means the form of tender as applicable General and Special Conditions of contract, and the specifications and/or drawings as given to contractors for the purpose of preparing their tender including "Notice Inviting Tender".
- (c) The "WORK" means the work described in the tender documents in individual work order and/ or accompanying drawings and specifications as may be issued from time to time to the contractor by the Engineer-in-Charge in writing the power conferred upon them, including all modifications or additional works and obligations to be carried out either at the site or in factory, workshop or any other place as may be essentially required for the performance of the work.
- (d) The "SITE" means the land and/ or other place on into or through which the work is to be executed under the contract or any adjacent land, part or structure which may be allotted to or used for the purpose of carrying out the contract.
- (e) The "CONTRACTOR" means the individual firm or company whether incorporated or not, undertaking the work and shall include the legal personal representatives of such individuals or the person(s) composing the firm or company and the permitted assigns of such individuals or firm or company.
- (f) The abbreviations "SE/ Dy. Mgr/ Mgr./ Sr. Mgr/ DGM/ Sr. DGM/ AGM/ GM" means Senior Engineer/ Deputy Manager/ Manager/ Senior Manager/ Deputy General Manager/ Sr. Dy. General Manager / Additional General Manager / General Manager respectively who will direct the contract.
- (g) The "ENGINEER-IN-CHARGE " means the Engineer/ Sr. Engineer or any other executive deputed by BHEL to supervise the work or part of the work on behalf of the First Party.
- (h) Accepting authority: As per BHEL Delegation of Power
- (i) "APPROVED" means the approval of directions of the Sr. Manager/ Manager/ Dy. Manager or person deputed by them for the particular purpose.

"Bharat Heavy Electricals Limited" hereinafter referred to as BHEL shall mean the Head of the contracting / Outsourcing department / Other Administrator or other Administrative Officers of the said Company including the Engineer-in-Charge, Sr. Manager or other executive deputed by BHEL is authorized to invite tenders and enter into contract for works on behalf of the Company. BHEL means the Bharat Heavy Electricals Limited/ HPVP plant of the said Company at Visakhapatnam.
- (j) In the case of percentage rate contract, "Contractor's percentage" shall if the context so permits means the uniform percentage tendered by the contractor and accepted by the Accepting Officer and expression "Contract Rates" shall refer to rates in the Schedule of Quantities & Rates (SOQR).
- (k) The "CONTRACT SUM" means the sum accepted or the sum calculated in accordance with the prices accepted in tender and/ or the Contract rate as applicable to the contractor for the entire execution and full completion of the work.
- (l) The "FINAL SUM" means the actual amount payable under the contract by BHEL to the contractor for the entire execution and full completion of the work.
- (m) The "TIME OF COMPLETION" is the date or dates for completion of the work or any part of the work as set out in or ascertained in accordance with the individual work or the tender documents or any subsequent amendments thereto.
- (n) A "WEEK" means seven days without regard to the number of hours worked in any day in that week.
- (o) A "DAY" means a day of 24 (twenty-four) hours irrespective of the number of hours worked or not worked in that day.
- (p) A "WORK DAY" means day other than that prescribed by the Negotiable Instruments Act, as being a holiday and consists of the number of hours of labour as commonly recognized by good employers in the trade, in the district where the work is carried out or as laid in the BHEL Rules and Regulations.
- (q) "DEVIATION ORDER" means any order given by the Engineer-in-Charge to effect an alteration, addition or deduction, which does not radically affect the scope and nature of the contract.
- (r) "EMERGENCY WORK " means any urgent measures which in the opinion of the Engineer-in-Charge become necessary during the progress of the work to obviate any risk of accident or failure or which become necessary for security.

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- (s) "PROVISIONAL SUM" or "PROVISIONAL LUMPSUM" means a lump sum included by the BHEL in the work for which details are not available at the time of inviting tender.
- (t) "PROVISIONAL ITEMS" means items for which approximate quantities have been included in the tender documents.

SCOPE OF WORK

2.2 HEADING OF THE CONDITIONS:

The heading to these conditions shall not affect the interpretation thereof. The decision of BHEL regarding interpretation of any of terms and conditions set forth in this agreement shall be final and binding on the contractor

2.3 CONTRACT DOCUMENTS:

The accepting officer shall furnish to the contractor on demand, two copies of the signed drawings and schedule, and copies of all other relevant documents and specifications and the Engineer in- charge or his representative shall have, at all reasonable times, access to them.

2.4 WORKS TO BE CARRIED OUT:

The contractor shall, except as provided under schedule include all labour, materials, tools, plant, equipment & transport which may be required in preparation for, and in the entire execution and full completion of work. Schedule shall be deemed to have prepared in accordance with good practice and recognized principles & unless otherwise stated the descriptions given therein shall be held to include rate on materials, carriage, and cartage, lead, return of empties, hoisting, setting, fitting in position and all other labour necessary in and for the entire execution and full completion aforesaid. Any error in description or in quantity in schedule or any omission there from shall not vitiate the contract or release the contractor from the execution of the whole or any part of the work comprised there in accordance to the drawings and material workmanship but the articles or materials specified may be obtained from any other firm subject to the prior written approval of the Unit Head of the First Party.

In case of any discrepancy between schedule, the specification and/ or the drawings, the Accepting Officer shall be the deciding authority as to which shall prevail and his decision shall be final and conclusive. If neither drawings nor specifications contain any mention of minor details of construction, which in the opinion of the Accepting Officer are essentially as are reasonably and obviously and fairly intended for the satisfactory completion of the work, whose decision shall be final and conclusive. Such details shall be provided by the contractor without any extra cost as if they were specifically mentioned and shall be deemed to be included in the contract. The contractor shall be deemed to have satisfied himself as to the nature of site, local facilities of access and all matters affecting the execution and completion of the work. No extra charges consequent on any misunderstanding in these respects or otherwise will be allowed by the First Party.

2.5 DEVIATIONS:

The contractor shall not make any alteration and addition to or omission from the work as described in the tender documents except in pursuance of the written instructions of the Engineer-in-Charge. No such DEVIATION from the work described in the tender documents shall be valid unless the same has been specifically confirmed in writing.

The Accepting Officer may deviate, either by way of addition or deduction from the work so described provided that the contract sum thereby carried on the whole, by not more than the percentage set out in the tender documents. The value, of all additions and deductions will be added to or deducted from the contract sum. Whenever the Accepting Officer intends to exercise such a right, his intention shall specify the deviations, which are to be made on the lump sum assessment or the proposed basis of payment, the extra items allowed, if any, and the date for completion of entire contract. Any objection by the contractor to any matter consisting the order shall be notified by him in writing to Engineer-in-Charge within seven days from the date of such order, but under no circumstance shall the work be stopped (unless so ordered by the Engineer-in-Charge) owing to such difference or controversy that may arise from such an objection by the contractor. The Contractor shall be deemed to have accepted the order and the conditions stated therein. In the event of the contractor failing to agree with Engineer-in-Charge regarding the terms of proposed deviation, the objection shall be referred to the Accepting Officer or officer authorized by Accepting Officer whose decision shall be binding on the contractor.

2.6 TIME:

Time is the essence of the contract and is specified in the tender document or in each individual work order.

As soon as possible after the contract is let or any substantial work order is placed and before the work is to begin, the Engineer-in-Charge and the contractor shall (if so required by the Engineer-in-Charge) agree a time and progress chart for completion of the work within the scheduled time. The chart in the work order shall have the completion date of the individual items thereof and/ or the contract or order as a whole. It shall indicate the forecast of the dates for commencement and completion of the various processes or sequences of the work, and shall be amended as may be required by agreement between Engineer-in-Charge and contractor writing the limitations of time imposed in the tender document or order.

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In the absence of any specific time and progress chart to be agreed to between the contractor and Engineer-in-Charge, the contractor shall ensure and maintain, uninterrupted progress of the work such that the entire work shall be completed within the time imposed in the tender documents or order and the proportion of work that shall be completed up to any time in relation to the entire work to be done under the contract or order shall not be less than the proportion that the time elapsed bears to the total time of completion provided in the tender documents or order. The contractor shall suspend the execution of the work or any part or parts thereof whenever called upon in writing by the Engineer-in-Charge. The contractor will be allowed an extension of time for completion limited to not less than the period of suspension but no other claim in respect for compensation or otherwise whatsoever will be admitted. Time may also be extended to allow for alteration of work made by the deviation order as may be decided upon by the Engineer-in-Charge in consultation with the contractor.

2.7 STORE AND MATERIALS:

The contractor shall, at his own expense, supply all stores and material required for the contract other than free issue materials provided by BHEL at the rates detailed therein subject to their availability at the place of issue indicated therein. All stores and materials to be supplied by the contractor shall be of the best kind as described in the specification and the contractor shall ensure that the stores and materials so comply with the specifications. The contractor shall, at his own expense and without delay, supply samples of stores and materials proposed to be used in the execution of the work for the approval of Engineer-in-Charge, who may reject all stores and materials not corresponding either in quantity or character to the approved samples. The stores and materials so rejected shall be duly replaced by the Contractor in time to ensure completion of the work as scheduled and the rejected stores/ materials shall also be replaced by him at his own cost and effort.

In case of stores and material provided by BHEL, the contractor shall bear the cost of loading, transporting to site, unloading, storing under cover and as required, assembling and jointing the several parts together as necessary and incorporating fixing these stores and materials in the work including all preparatory work of whatever description that may be required, and returning empty cases or containers to the place of issue without any extra charge.

2.8 DELAY AND TIME EXTENSION:

If in the opinion of Engineer-in-Charge the work is delayed by any one or more of the following:

- 1) By reason of abnormally bad weather,
- 2) By reason of serious loss or damage by fire,
- 3) By reason of civil commotion, local combination of worker, strike or lockout, affecting any of the trades employed on the work,
- 4) By delay on the part of the agency or tradesmen engaged by B.H.E.L./ HPVP in executing work not performing part of this contractor,
- 5) Earthquake & floods
- 6) Busy of nation
- 7) Riots
- 8) Non-availability of stores which are responsibility of BHEL etc. the same shall be covered under force majeure.
- 9) Any Other Reason.

By reason of any other cause, which in the absolute discretion of the Engineer-in-Charge (when he is the accepting officer of the contract), is beyond the contractor control. When in such case(s) the accepting officer, on recommendation of the Engineer-in-Charge (or higher authority) to be specified in this regard, may make fair and reasonable extension in the completion date of the individual items of work of the contract as a whole. Such extension, which will be communicated to the contractor by the Engineer-in-Charge in writing, but shall nevertheless use constantly his best endeavour to prevent or make good the delay and shall do all that may be reasonably required to the satisfaction of the Engineer-in-Charge to proceed with the work. The delay caused on this account may be waived by the Accepting Officer on merit, based on the written request of the Contractor.

2.9 PATENT RIGHTS:

The contractor shall fully indemnify BHEL or the agent servant or employees or BHEL against any action, claim or proceeding to infringement or the use of any patent or design or any alleged patent or design rights, and shall pay any royalties which may be payable in respect of article or part thereof included in the contract. In the event of any claims being made or action against BHEL in respect of any of the matters aforesaid, the contractor shall immediately be notified thereof for taking necessary action provided that the payment of indemnity shall not apply when such infringement has taken place, in complying with the specific direction issued by BHEL but the contractor shall pay any royalties payable in respect of any such use.

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2.10 TAXES & DUTIES:

All charges on account of taxes and/or duties on materials obtained for the work (excluding materials provided by BHEL) shall be as per Notice of Inviting tender.

2.11 ROYALTIES:

Royalties fixed from time to time as per prevalent local rules will be recovered for materials, after which the contractor may be allowed to remove from quarries situated on land, which is in the charge of BHEL authorities.

2.12 PLANT:

The contractor, shall at his own expense, supply all tools plants and equipment (herein after referred to as T & P) required for the execution of the contract, as specified in the tender documents.

2.13 ASSIGNMENT OR TRANSFER OF CONTRACT:

The contractor shall not without prior written approval of the accepting officer, assign or transfer the contract or any part thereof or any share, or interest wherein to any other person. No sum of money which may become payable under the contract shall be payable to any person other than the contractor without prior written approval of Accepting Officer to the assignment or transfer of such money.

SUB CONTRACT: The contractor shall not sub-contract any portion of the contract without the prior written approval of the Accepting Officer.

2.14 LAWS GOVERNING THE CONTRACT:

BHEL reserves the right to take penal action as deemed fit if any information provided by the vender / contractor is found to be incorrect. This contract shall be governed by the Indian Laws for the time being in force.

2.15 COMPLIANCE TO REGULATION AND BYE LAWS:

The contractor shall conform to the provisions of any statute relating to the work and regulations and bye-laws of any local authority and of any water and lighting companies or undertakings with whom/whose systems the work is proposed to be connected. Before making any variation from the drawings or specifications so as to necessitate for such connections the contractor shall give notice to Engineer-in-Charge specifying the variations proposed to be made and the reasons thereof. Until he has received instructions from the Engineer-in-Charge in respect thereof, the contractor required shall be bound to give all notice by statute regulations or bye-laws as aforesaid and to pay all fees and taxes payable to any authority in respect thereof.

PERFORMANCE OF THE CONTRACT

2.16 ORDERS UNDER THE CONTRACT:

All orders, notices etc. to be given under the contract shall be in writing, typescript or printed and if sent by registered post to the address given in tender of the contractor, shall be deemed to have been on the date when in ordinary course they would have been delivered to him. The contractor shall carry out without delay all orders given to him.

2.17 ADMISSION TO THE SITE:

The contractor shall not enter on (other than for inspection purpose) or take possession of the site unless permitted to do so by Engineer-in-Charge. The portions of the site to be occupied by the contractor shall be clearly defined and marked on the site plan, and the contractor will not on any account be allowed to extend his operations beyond these areas.

The contractor shall be provided if necessary or required at site, temporary access thereto and shall modify and maintain the same as required from time to time. He shall take out and clear away and access route when no longer required, restoring the area to its original condition. The Engineer-in-Charge shall have power to execute other works whether or not connected with the work in contract agreement on the site contemporaneously with the execution of the original work and the contractor shall give reasonable facilities for this purpose.

BHEL reserves the right of taking over, at any times any portion of the site which they may require and the contractor shall at his own expense clear such portion forthwith. The photographs of the site of work or any part therein shall be taken, published or otherwise circulated with the prior approval of Engineer-in-Charge.

No such approval shall, however, exempt the contractor from complying with any statutory provision in regard to the taking and publication of such photograph. No such approval shall, however, exempt the contractor or shall give him the right to entry to the site at all time. The Engineer-in-Charge shall have the power to exclude from the site any person of the Contractor whose admission thereto may in his opinion be undesirable for any reason whatsoever.

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2.18 CONTRACTORS SUPERVISORS:

The contractor shall either himself supervise the execution of the contract or shall appoint competent agent approved by the Engineer-in-Charge to act in his stead.

The contractor shall employ such Agent having at least DEGREE of BACHELOR of Engineering from a recognized University for contract value exceeding rupees ten lacs, or having at least a diploma in engineering from a recognized college for contract value exceeding Rs.5 lacs but not exceeding Rs ten lacs. The employment of any agent as aforesaid shall not be necessary if the contractor himself is in possession of recognized technical qualification and is in opinion of the Engineer-in-Charge, capable of receiving instructions of the Engineer-in-Charge and for execution of the works to the full satisfaction of the Engineer-in-Charge. If the contractor fails to appoint a suitable Engineer/ agent as aforesaid, the Engineer-in-Charge shall have full power to suspend the execution of work and stop payment of any advance that may become due until such date till a suitable Engineer/ agent is appointed and the contractor shall be held responsible for the delay caused to the work and no extension of time on this account shall be given to him as stipulated in condition mentioned above.

Orders given to contractor's agent shall be considered to have the same force as if they had been given to the contractor himself.

The contractor or his accredited agent shall attend whenever required and without making any claim for doing so, either to the office of the Engineer-in-Charge or the work site to receive instructions. The Engineer-in-Charge shall have full power and without assigning any reason, to require the contractor immediately and cease to employ in connection with this contract any agent, servant or employee whose continued employment is, in his opinion, undesirable. The contractor shall not be allowed any compensation on this account.

2.19 LABOUR LAWS TO BE COMPLIED WITH BY THE CONTRACTOR:

The contractor shall employ labour in sufficient number to maintain the required rate of progress and of quality required to ensure workmanship of the degree required by the specifications and to the satisfaction of the Engineer-in-Charge.

Contractor shall decide the number of employees to be deployed for execution of the work awarded to him and he or his authorized representative will be solely entitled to dictate such workers about the manner of carrying out the work as per the prescribed specifications and quality plan.

Contractor to ensure that the employees deployed in the premises of BHEL are physically and mentally fit and do not have any criminal record. Such employees should possess requisite skill, proficiency, qualification, experience etc. Contractor to provide employment card / identity with photograph duly verified and attested by the contractor to his employees. Contractor to indicate the name of the proprietary/ partnership firm/ company, place of work, contract no. and duration of validity of card. Contractor will be responsible for good conduct of his employees. In case of any misconduct / misbehaviour by any employee, the contractor will replace such employee(s) immediately.

BHEL shall have the privity of the contract with the contractor only and will give instructions to the contractor or his authorized representatives. BHEL will have nothing to do or be concerned with the employment of employees working for the contractor. The relationship between BHEL and the contractor will be that of independent entities and nothing herein contained will amount to joint venture, partnership or an employer employee relationship.

The contractor shall obtain a valid labour licence under the Contract Labour (R&A) Act 1970, and the Contract Labour (Regulation and Abolition) Central Rules 1971, before the commencement of the work, and continue to have a valid licence until the completion of work. The contractor shall also abide by the provisions of the Child Labour (Prohibition and Regulation) Act 1986. The relevant statutory provisions of the State Government of Andhra Pradesh shall also be applicable in toto. The contractor shall observe provisions of the Factories Act in respect of working hours, holidays, rest intervals, leaves and overtime to his employees. No work shall be done on second/ third shift, overtime, Sundays or on other declared holidays without written permission from BHEL.

Any failure to fulfil this requirement shall attract the penal provisions of the Contract arising out of the resultant non-execution of the work.

Payment of wages:

The contractor shall pay to labour employed by him either directly or through sub-contractors, in accordance with the provisions of the Contract Labour (Regulations and Abolition) Act 1970 and the Contract Labour (Regulation and Abolition) Central Rules 1971 or Minimum Wages Act wherever applicable, including the relevant statutory provisions of the State Government. The contractor shall ensure payment of wages to the Contract labour employed by him latest by 7th of the following month. The above payments shall be verified by the departmental supervisor under his name and designation.

- II. In respect of all labour directly or indirectly employed in the works for performance of the contractor's part of this contract, the Contractor shall comply with or cause to be complied with the BHEL's Contractor's Labour Regulations made by BHEL from

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time to time or as per the provisions of the Contract Labour (Regulations and Abolition) Act 1970 and the Contract Labour (Regulation and Abolition) Central Rules 1971 and Minimum Wages Act wherever applicable.

- III. (A) The Engineer-in-Charge concerned shall have the right to deduct from the moneys due to the contractor any sum required or estimated to be required for making good the loss suffered by a worker or workforce by reason of non-fulfilment of the conditions of the contract for the benefit of the workers, non-payment of wages or of deductions made from his or their wages which are not justified by their terms of the contract or non-observance of the regulations.
- B) Under the provisions of Minimum Wages (Central) Rules 1950, the contractor is bound to allow to the labours directly or indirectly employed in the works one-day rest for 6 days continuous work and pay wages at the same rates as for duty. In the event of default, the Engineer-in-Charge shall have the right to deduct the sum or sums not paid on account of wages for weekly holidays to any labour and pay the same to the persons entitled thereto from any money due to the contractor by the Engineer-in-Charge concerned.
- IV. The contractor shall duly comply with the provisions of the Payment of wages Act-1936, Minimum Wages Act 1948, Employees liability Act-1938, Workmen's compensation Act-1923, Industrial Disputes Act 1947, Maternity Benefits Act 1961, EPF and MP Act 1952, Payment of Gratuity Act 1972, Income tax Act, Service Tax Act, Employees State Insurance Act, Payment of Bonus Act 1967 etc. and the Contract Labour (Regulations and Abolition) Act 1970, or the modifications thereof or any other laws relating thereto and the rules made there under from time to time.
- a) Contractor must ensure payment of PF, pension dues under EPF and MP Act 1952 to the RPFC.
- b) Contractor must ensure payment of ESI contribution under ESI Act 1948 and provide ESI membership No. / Card of each employee.
- c) Contractor shall produce proof of deductions as well as remittances of PF, Pension, ESI contribution; administrative charges etc. wherever applicable and shall maintain proper records. Contractor to issue wage slip to his employees.
- d) The contractor shall furnish proper returns to the concerned statutory authorities like PF etc. and also provide a copy of the same to BHEL.
- e) In case of non compliance of any of the labour laws e.g. payment of minimum wages to his employees or remittance of contribution to the concerned authorities etc., the contractor shall be responsible for all the expenses /liability occurring/ accruing on BHEL because of this including expenditure of legal proceedings. All such expenses shall be recoverable from the contractor from any of his running contracts / security deposit / other dues with BHEL or from any contract entered with BHEL thereafter.
- f) Payment of bonus under the Payment of Bonus Act, payment of Gratuity under the Gratuity Act and retrenchment compensation under act will be the sole responsibility of contractor.
- g) Contractor shall pay minimum wages as applicable from time to time including leave with wages to their workers as per rules /act.
- h) Contractor will give three National Holidays to his workers.
- V. The contractor shall indemnify and keep BHEL indemnified against statutory payments to be made under for due observance of the laws aforesaid as well as the BHEL contractor's Labour Regulations without prejudice to his rights to claim indemnity from his sub-contractors not affecting BHEL under any event or statutory violation by the contractor.
- VI. The laws aforesaid shall be deemed to be part of this contract and any breach thereof shall be deemed to be a breach of the contract.
- VII. Whatever is the minimum wage for the time being, such wage shall be paid by the contractor to the workmen directly without any intervention of jamadar and that jamadar shall not be entitled to deduct or recover any amount from the minimum wage payable to the workmen and by way of commission or otherwise.
- VIII. The contractor shall ensure that no amount by way of commission or otherwise is deducted or recovered by that jamadar from the wages of workmen engaged by him in the work premises of BHEL.
- IX. All the registers and records shall be preserved in original for a period of 3 years from the passing of final bill and shall be produced on demand before any officer, inspector, etc. of the Government/ BHEL.
- In respect of all labours directly or indirectly employed in the work of the performance of the contractor's part of the contract, the contractor shall its own expenses arrange for the safety provisions as per BHEL safety clause framed from time to time and shall its own expense provide for all facilities in connection therewith. In case the contractor fails to make arrangement and provide necessary facilities aforesaid the Engineer-in-Charge shall be at liberty to make arrangement and provide facilities as aforesaid and recover in full the costs incurred in that behalf from the contractor.
- Should it appear to the Engineer-in-Charge that the contractor is not properly observing and complying with the provisions of the BHEL Contractor's Labour Regulations and Model Rules and the Contract Labour (Regulation and Abolition) Central

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Rules 1971, for the protection of health and sanitary arrangements for the workmen employed by the contractor, (hereinafter referred as "the said Rules") the Engineer-in-Charge shall have the power to give notice in writing to the contractor requiring that the said rules be complied with and the amenities prescribed therein be provided to the workmen within a reasonable time to be specified in the notice. If the contractor shall fail within the period specified in the notice to comply with and/observe the said Rules and to provide the amenities to the workmen as aforesaid, the Engineer-in-Charge shall have the power to provide amenities herein before mentioned at the cost of the contractor.

The Engineer-In charge may require the contractor to dismiss or remove from the site of the work any person or persons in the contractor's employee upon the work who may be incompetent or misconduct himself and the contractor shall forthwith comply with such requirements.

It shall be the responsibility of the contractor to see that the building under construction is not occupied by anybody unauthorized during construction, and is handed over to the Engineer-in-charge with vacant possession of complete building. If such building though completed is occupied illegally, then the Engineer-in-charge shall have the option to refuse to accept the said building/ buildings in that position.

However, the Engineer-in-charge, through a notice, may require the contractor to remove the illegal occupation any time on or before construction and delivery. The contractor will be liable for all payments to be made under the law and for the observance of the regulations aforesaid without prejudice to his right to claim indemnity from his subcontractor.

2.20 ACCOMMODATION FOR LABOUR:

The contractor shall during the progress of the work, provide, erect and maintain at his own expense and approved standards and scales, all necessary temporary living and sanitary accommodation required for his work people on the site, in connection with the execution of the work and also arrange for supply of wholesome drinking water for his work people.

The planning, sitting, layout and erection of these temporary buildings shall be approved by the Engineer-in-Charge and the whole of such temporary accommodation shall at all times during the progress of the work be kept tidy and in clean sanitary conditions to the entire satisfaction of the Engineer-in-Charge and at the contractor's expenses. The contractor shall confirm generally to the sanitary requirements of the local medical and health authority and at all times with such precautions that may be necessary to prevent soil pollution of the site.

On completion of the work all such temporary buildings shall be cleaned away, all rubbish burnt, excrete or other disposal pits or trenches filled and effectively sealed off and the whole of the site left clean and tidy to the entire satisfaction of the Engineer-in-Charge and at the contractors expense.

2.21 ANTI MALARIAL PRECAUTION:

The contractor shall at his own expenses, conform to all anti-malarial instruction given to him by the Engineer-in-Charge including filling up of borrow pits, if any.

2.22 CONSERVANCY:

The contractor shall at his own expenses, carry out all instructions issued to him by Engineer-in-Charge to effect a proper disposal to night soil and other conservation work in respect of the contractors work people or his employees on the site.

The contractor will bear the cost of any charges levied by the local authority for the execution of such work on his behalf.

2.23 NUISANCE:

The contractor shall not at any time do, cause or permit any nuisance on the site or do anything which may cause unnecessary disturbance or inconvenience to the owners, tenants or occupier of other properties near the site and to the public generally and shall secure the efficient protection of streams and water ways against pollution.

2.24 WATER & ELECTRICITY:

Water and electricity shall be supplied to the contractor by the department subject to the following conditions:

- One/ two source of supply of water/ electricity points, to be decided by Engineer-in-Charge, shall be provided by BHEL. However, contractor shall have to make their own arrangement for laying of pipelines/ connection from the main source of supply for working at site.
- Department do not guarantee to maintain uninterrupted supply of water/ electricity and it will be incumbent on the contractor to make alternative arrangement for proper supply of the same at their own cost in the event of any break down in the government water/ electricity mains so that the progress of work is not held up for the want of the same. No claim of damage or refund will be entertained on account of such break down.
- In case of non-availability of above facilities at work place, contractor has to make his own arrangements at his cost or as mentioned in the NIT.

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2.25 TEMPORARY WORKSHOPS STORES etc.:

The contractor shall, during the progress of work, provide, erect and maintain at his own expense all necessary temporary work-shops, stores, offices etc. required for the proper and efficient execution of work. The planning, sitting and execution of these buildings/ works shall have the approval of the Engineer-in-Charge and the contractor shall at all times keep them tidy in a clean and sanitary condition to the entire satisfaction of the Engineer In-charge.

2.26 STORES AND MATERIALS ON SITE:

All stores and materials for the work are to be deposited by the contractor only in places to be indicated by the Engineer-in-Charge, where in accordance with the contract, stipulations certain stores and materials (for incorporation in the work) are to be issued to the contractor by BHEL as detailed.

BHEL free issue items will be so issued only to the extent required for the actual completion of the work as stipulated in the contract. The decision of Engineer—in-Charge / Head of the department regarding the quantities to be issued as above shall be final and binding on the contractor. For any excess quantities consumed on the work, the cost will be recovered from the contractor at punitive rates, which will be as mentioned in Schedule “B”.

As regard issue of material and stores to be issued to the contractor by BHEL, the contractor shall give the Engineer-in-Charge reasonable notice in writing of his requirement of such stores/ materials and on the approval of his demand being notified to him, he shall make immediate arrangement for drawing the same. Such stores and materials shall be transported by the contractor at his own expense direct from the place of issue to the site of work with the prior written approval, obtained from the Engineer-in-Charge to take them to a store or work shop or elsewhere. BHEL officers connected with the contract shall have the power at any time to inspect and examine any stores or at any factory or workshop or other place where material intended to be used in or on the workshop, or other places such stores or materials are being fabricated or manufactured, or at any place where the same are lying and the contractor shall give necessary facilities for such inspection and examination.

The Engineer-in-Charge shall be entitled to have tests made of any stores or materials supplied by the contractor who shall provide at his own expense all facilities which the Engineer-in-Charge may require for this purpose. If at the discretion of Engineer-in-Charge, independent expert is employed to make any such test, his charges shall be borne by the contractor only, if the test disclosed that the said stores or materials are not in accordance with the provisions of the contract.

Should the Engineer-in-Charge consider at any time during the construction or reconstruction or prior to the expiry of the maintenance period that the stores or materials provided by the contractor are unsound or of a quality inferior to the constructed or otherwise and not in accordance with the contract (in respect whereof the decision of the Engineer-in-Charge shall be final and conclusive). The contractor shall on demand in writing from the Engineer-in-Charge specifying the stores or materials complained or notwithstanding that the same may have been inadvertently passed, certified and paid for, forthwith remove the stores or materials so specified and provide other proper and suitable stores or materials at his own expense to the entire satisfaction of Engineer-in-Charge and in the event of his failing to do so within a period to be specified by Engineer-in-Charge in his demand aforesaid, the Engineer-in-Charge may replace with others, the stores or materials complained of, at the risk and expense in all respect of the contractor.

The liability of the contractor under this condition shall not extend beyond the maintenance period aforesaid except as regard stores or materials, which the Engineer-in-Charge shall have previously given, notice to the contractor to replace that. (Maintenance period for any work under this organization will be TWELVE MONTHS from the date of actual completion of the particular work and handing over to BHEL in the case of building works and SIX MONTHS for all other works.).

All stores and materials brought to the site shall become and remains the property of BHEL and shall not be removed from the site without the prior written approval of the Engineer-in-Charge. However, when the work is finally completed, the contractor shall at his own expense forthwith remove from the site surplus stores and materials originally supplied by him and upon such removal the same shall revert and become the property of the fixing in the work and which after making due allowance for the reasonable wear and tear/ or waste have not on completion of the works been so incorporated or fixed, shall be returned by the contractor at his own expense to the place of issue.

Credit for surplus stores and/ or material returned by the contractor to BHEL will be given to him at a price, based on the prevailing market rate but not exceeding that at which the said stores and materials were originally issued to him but due consideration shall be given to the allowance claimed by BHEL, in respect of any depreciation or damage suffered by the stores and / or materials while in the custody of the contractor regarding which the decision of Engineer-in-Charge shall be final and conclusive.

If in the opinion of the Engineer-in-Charge (which will be final and conclusive) any stores supplied by the BHEL have either during progress of work or after completion of work but under the custody of the contractor, become damaged to such an extent that they cannot be usefully utilized either in the same work or in other work, the Engineer-in-Charge shall not accept

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the stores and in the event of his so rejecting, the contractor shall be charged for the said stores at a rate fixed by the accepting officer. The contractor shall not be entitled to any claim whatsoever on this account.

2.27 TOOLS AND PLANTS ON SITE:

All tools, plants and equipment brought to site shall become the property of the BHEL and shall not be removed from the site without the prior written approval of the Engineer-in-Charge. When the work is finally completed or contract is terminated for reasons other than the default of the contractor, the contractor shall forthwith remove from the site all tools, plants and equipments (other than those as may have been provided by BHEL) and upon such removal the same shall become the property of the contractor.

2.28 STATEMENT OF HIRE CHARGES:

A monthly detailed statement of the hire charges incurred in respect of BHEL tools, plants, equipment etc. shall be given to the contractor by the Engineer-in-Charge.

2.29 PRECAUTIONS AGAINST RISK:

The contractor shall be responsible for providing at his own expense, for all precautions to prevent loss or damage from any and all risk and to minimize the amount of any such loss or damage and for necessary steps to be taken for the said purpose until the works have been handed over complete in all respect to the Engineer In-charge.

The contractor shall provide all watchmen necessary for the protection of site, the work, the materials, tools, plants, equipment and anything else lying in the site during the progress of work. He shall solely be responsible for and shall take all responsible and proper steps for protecting, securing and watching all and/ or about the work and the site which may be dangerous to any person whatsoever.

2.30 NOTICES AND FEES:

The contractor shall give all notices required by any statutory provisions or by the regulations and/ or bye-laws or any local authority and/ or of any public service, company or authority affected by the work or with those systems if the same are or will be contracted. The contractor shall pay and indemnify BHEL against any fees and charges demandable by law under such Acts, Regulations and/ or bye-laws in respect of the work and shall make and supply all drawings and plans required in connection with any such notice.

2.31 SETTING OUT OF THE WORK & PROTECTING/ MAINTAINING SIGNALS & MARKS:

The Engineer-in-Charge shall supply dimensions, drawings, levels and other information necessary to enable the contractor to set out the work. The contractor shall at his own expense set out accurately according to the drawings, figures and dimensions there, on all the work in the contract and any extras or additions thereto and shall be solely responsible for their being so set out and executed. All bench marks, pegs, signals on surface, alignment stones, mile stones and all similar marks whether putting by BHEL authorities for the purpose of checking the contractor's work in the tenure of the contractor, be put under the care of the contractor who shall, at his own expense take all proper and responsible precautions and care to preserve and maintain them in their true position. In the event of these marks being disturbed or obliterated by accident or due to any other cause whatsoever the same may, if deemed necessary, be replaced by Engineer-in-Charge / Head of the department to the contractor's expense and the cost thereof deducted from any money thereon or/ after becoming due to the contractor.

Where requested by the contractor, the level mark, centre line and chain age pegs corresponding to those as shown on the drawings, will be pointed out to the contractor on the ground but all bench marks or chain age pegs additional to these shown on the drawing shall be provided by the contractor at his expense.

2.32 SITE DRAINAGE:

All water that may accumulate on the site during the progress of the work or in trenches and excavations shall be removed by the contractor to the entire satisfaction of the Engineer-in-Charge at his own expense.

2.33 EXCAVATION RELICS etc.:

Material of any kinds obtained from excavation on the site shall remain the property of BHEL and shall be disposed off as the Engineer-in-Charge directs. All gold, silver, oil and other materials of any description and all precious stones, coins, treasures, relics, antiquities and other similar items which may be found on at/upon the site shall be the property of the BHEL.

2.34 FOUNDATIONS:

The contractor shall not lay any foundation until the excavations for the same have been examined and approved in writing by the Engineer-in-Charge.

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2.35 COVERING OF WORK:

The contractor shall give reasonable notices in writing to the Engineer-in-Charge whenever any work is to be permanently covered or cancelled, whether by earth or other means so that it can finally be inspected or measured if necessary. In default of doing so the contractor shall, if required by the Engineer-in-Charge uncover such work at his own expense.

2.36 APPROVAL OF WORKS BY STAGES:

All work embracing more than one process shall be subject to examination and approval at each stage and the contractor shall give due notice in writing to the Engineer-in-Charge when each stage is ready. In default of such notice being received, the Engineer-in-Charge shall be entitled to approve the quality and extent thereof at any time he may choose and in the event of any dispute, the decision of the Engineer-in-Charge thereon shall be final and conclusive.

2.37 EXECUTION OF WORK:

The work shall be executed in a workman like manner and to the satisfaction in all respect of the Engineer-in-Charge. The Engineer-in-Charge will communicate or confirm his instruction to the contractor in respect of the execution of the work in a "WORK SITE ORDER BOOK " maintained at his office and the contractor shall visit this office, daily and shall conform receipt of such instructions by signing the relevant entries in this book. Such entries will rank as order notices in writing within the intent and meaning of these conditions.

2.38 RESPONSIBILITY FOR BUILDINGS:

In the event of any building or part of any building being handed over to the contractor for execution of work thereto under provisions of the contract, he shall give a written receipt for all fixtures, glasses etc. and shall be required to make good at his own expense all damage resulting from whatsoever cause while in his charge and on completion of the work to deliver up the said building or part thereof in a clean stage complete in every particular to the entire satisfaction of the Engineer-in-Charge.

2.39 INSPECTION OF WORKS:

BHEL Officers / BHEL representatives concerned with the contract shall have power at any time in respect and examine any part of the work and the contractor shall provide such facilities as may be required for such inspection and examination. Should the Engineer-in-Charge consider at any time during the construction or reconstruction or prior to the expiry of maintenance period, that any work has been executed with unsound, imperfect or unskilled workmanship or of a quality inferior to that contracted for or not otherwise in accordance with the contract, in respect whereof the decision of the Engineer-in-Charge shall be final and conclusive. The contractor shall on demand in writing from the Engineer-in-Charge specifying the fault notwithstanding that the same may have been inadvertently passed, certified and paid for, forthwith rectify or remove and reconstruct, the work so specified, in whole or in part as the case may be, require at his own risk and expense to the entire satisfaction of Engineer-in-Charge, who may accept the work at reduced rate if deemed fit. However, the liability of the contractor under this condition shall not extend beyond the maintenance period except as regard workmanship, which the Engineer-in-Charge should have previously given notice to the contractor to rectify.

2.40 DAMAGE AND LOSS TO PRIVATE PROPERTY AND INJURY TO WORKS:

The contractor shall at his own expense reinstate and make good to the satisfaction of the Engineer-in-Charge and pay compensation for any injury, loss or damage caused to any property or right what so ever including property or/ and rights of BHEL (or agent /servants/any outsider or employees of BHEL) and the injury, loss or damage arising out of or in any way in connection with the execution or purported execution of the contract and further the contractor shall indemnify BHEL, against all claims enforceable against BHEL) or which would be so enforceable against BHEL were BHEL a private person in respect of any such injury (including injury resulting in death, loss or damage to any person whatsoever or property, including all claims which may arise under Workman's Compensation Act or otherwise.

2.41 COMPLETION:

The works shall be completed to the entire satisfaction of the Engineer In-charge and in accordance with contractor's forecast of time and progress where operative and that, all unused stores and materials, tools, plant, equipment, temporary buildings and things shall be removed and the site and work cleared of rubbish and all waste material and delivered up clean and tidy to the satisfactions of the Engineer In-charge at the contractor's expense on or before the scheduled date of completion. BHEL shall have power to take over from the contractor from time to time such section of work as have been completed to the satisfaction of the Engineer In-charge. The Engineer-in-Charge shall certify to the state of the work at the end of the maintenance period where applicable.

2.42 COMPENSATION AS LIQUIDATED DAMAGES FOR DELAY:

If the contractor fails to complete and clear the site on or before the scheduled date of completion or does not achieve the progress as set out under the caption "TIME " in clause 2.6 of these General Conditions, he shall without prejudice to any other right or remedy on BHEL on account of such breach, be liable to pay as compensation as liquidated damage an amount

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equal to 0.50 percentage of the total contract sum for every week (7 days) of extension sought beyond the scheduled date of completion of the contract provided always that the total amount of compensation as liquidated damages to be paid under this condition shall not exceed 10% of the contract sum. Such amount may be adjusted or set off against any sum payable to the contractor under this or any other contract. If delay is for 8 days, it will be counted as delay for 2 weeks for liquidated damages. In case any penalty is to be levied at any stage during the progress of work, reference shall be made to the clause as mentioned in special condition of tender.

2.43 CANCELLATION OF CONTRACT FOR CORRUPT ACTS:

The Accepting Officer, whose decision shall be final and conclusive, shall without prejudice to any other right or remedy which shall have accrued or shall accrue thereafter, BHEL cancel the contract if any of the following cases and the contractor shall be liable to pay to BHEL for any loss or damage relating from any such cancellation to the same extent as provided in the case of cancellation of defaults.

If the contractor---

- a) Offer to give or agree to give to any person in BHEL service, any gift or consideration of any kind as an inducement or reward for doing or forbearing to do for having done or for borne to do any act in relation to obtaining or execution of this or any other contract for BHEL service

OR

- b) Enter into a contract with BHEL in connection with which commission has been paid or agreed to be paid by him or with his knowledge, unless the particulars of any such commission and the terms of payment thereof have previously been disclosed in writing to the Accepting Officer.

OR

- c) Obtain a contract with BHEL as a result of ring tendering or by non-bearing methods or competitive tendering without first disclosing the fact in writing to the Accepting Officer.

OR

- d) Steel or misuse of any property of BHEL either by himself or through his workmen within his knowledge or convince.

2.44 CANCELLATION OF CONTRACT DUE TO INSOLVENCY, ASSIGNMENT OR TRANSFER OR SUBLETTING OF CONTRACT:

The Accepting Officer, without prejudice to any other right or remedy, which shall have accrued or shall accrue thereafter to BHEL, shall cancel the contract in any of the following cases:

If the contractor -----

- a) Being an individual or if a firm, or any partner thereof shall at any time to be adjudged bankrupt or having a receiving order or order for administration of his estate made against him or shall take any proceedings for liquidation or composition under any Bankruptcy Act for the time being enforce or make any connivance or assignment or makes unauthorized or illegal arrangement for the benefit of his creditors or propose to do so, or if any application be made under any bankruptcy and for the time being in force for the sequestration of his estate or if a trust deed be granted by him on behalf of his creditors,

OR

- b) Being a company, shall pass a resolution or the court shall make an order for the liquidation of its affairs, or a receiver or Manager on behalf of the debenture holders shall be appointed or circumstances shall arise which entitle the court of debenture holders to appoint a receiver or Manager.

OR

- c) Assigns, sublets or attempts to assign, transfer or sublet any portion of the work without the prior written approval of the Accepting Officer,

Whenever the Accepting Officer exercises his authority to cancel the contract under this condition, he may complete the work by any means at the contractor's risk and expense, provided that, in the event of the cost of completion (as certified by Engineer-in-Charge, which is final and conclusive) being less than the contract cost the advantage shall accrue to the BHEL, and that if the cost of completion exceeds the money due to the contractor under the contract, the contractor shall either pay the excess amount ordered by the Engineer-in-Charge or the same shall be recovered from the contractor by other means

In case BHEL completes the work under the provisions of this condition, the cost of such completion to be taken into account in determining the excess cost to be charged to the contractor under this condition shall consist of the cost of materials purchased and/ or labour provided by BHEL with an addition of such percentage to cover superintendence and establishment charges as may be decided by the DGM / GM, whose decision shall be final and conclusive.

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2.45 CANCELLATION OF CONTRACT IN PART OR IN FULL FOR CONTRACTOR'S DEFAULT:

If the contractor—

- a) Makes default in commencing the work within a reasonable time from the date of handing over of the site and continues in that state after a reasonable notice from the Engineer-in-Charge.

OR

- b) In the opinion of the Engineer-in-Charge at any time, whether before or after the date or extended date for completion, makes default in proceeding with the work with due diligence and continues in that state after reasonable notice from Engineer-in-Charge.

OR

- b) Fails to complete the work, without prejudice to any other right or remedy which shall have accrued, or shall accrue thereafter to BHEL contract.

OR

- c) Fails to comply with any of the terms and conditions of the contract after reasonable notice in writing with order properly issued.

OR

- d) Fails to complete the work, work order, and items of work with individual dates for completion and clear the site on or before the date of completion, or if fails to achieve the conditions of contract, the Accepting Officer, may without prejudice to any other right or remedy which shall have accrued or shall accrue thereafter or do only such work order or items of work in default from the contract at the expense and cost of the contractor. Whenever the Accepting Officer exercises his authority to cancel the contract as a whole or in part under this condition, he may complete the work as a whole or part to under this contract, the contractor shall either pay the excess amount ordered by Engineer-in-Charge or the same shall be recovered from the contractor by other means.

In case of BHEL completes the work or any part thereof under the provisions of this condition, the cost of such completion to be taken into account in determining the excess cost to be charged to the contractor under this condition, shall consist of the materials purchased and/ or labour provided by BHEL with an addition of such percentage to cover superintendence and establishment charges as may be decided by the DGM whose decision shall be final and conclusive.

In the event of termination of contract for any reason whatsoever, the contractor shall withdraw all his employees from the establishment of BHEL. In case contractor decides to terminate services of his employees he should settle all terminal dues including retrenchment compensation.

2.46 TERMINATION OF CONTRACT DUE TO DEATH:

Without prejudice to any of the rights or remedies under this contract, if the contractor dies, the Accepting Officer shall have the option of terminating the contract without compensation to the contractor authorized survivors.

2.47 SPECIAL POWERS OF TERMINATION:

If at any time after the acceptance of the tender, BHEL shall for any reason whatsoever not require the whole or any part of the work, to be carried out, the Engineer-in-Charge shall give notice in writing of the fact to the contractor, who shall have no claim to any payment of compensation or otherwise, howsoever on account of any profit or advantage which he might have derived from the execution of the work in full but which he did not derive in consequence of the foreclosing of the work.

The contractor shall be paid at contract rates for the full amount of the work executed including such additional work i.e., cleaning of site etc. as may be rendered necessary by the said foreclosing. He shall also be allowed a reasonable payment (as decided by the Accepting Officer) for any expenses sustained on account of labour and material collected but which could not be utilized on the work as verified by the Engineer-in-Charge but the contractor shall not have any claim for compensation on account of any alterations having been made in the original specifications, drawings, designs and instructions involving and curtailment of the work as originally contemplated.

2.48 FAIR WAGE:

Refer clause 2.19 of General terms and conditions of Contract.

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CHAPTER-III

VALUATION AND PAYMENT

3.1 RECORDS AND MEASUREMENTS:

All items having a financial value shall be entered in the BHEL Measurement book so that a complete record is obtained on all work performed under the contract.

Measurement shall be carried out as per unit mentioned in the bill of quantity (price-bid).

The measurements shall be taken jointly by any person or persons duly authorized on the part of the BHEL and the contractor.

The Engineer-in-Charge shall give reasonable notice in writing to the contractor of appointments for measurements.

The contractor shall without extra charge, provide assistance with appliance and other things necessary for measurements.

The contractor shall bear all the cost of measurement of his work.

Measurements shall be entered in the BHEL measurement book and signed and dated by both parties each day on the site on completion of measurement. If the contractor objects to any of the measurement recorded on behalf of BHEL in the Measurement Book or against the item or items objected to, and such note shall be signed and dated by both parties engaged in taking the measurements.

If as a result of such objection it becomes necessary to remeasure the work wholly or in part, the expense of such measurement shall be borne by the party requiring the measurement to be retaken provided that net error found by this remeasurement amount to less than 5 % (five percent) of the value as recorded by the first measurement.

If the contractor's representative fails to attend when required, the Engineer-in-Charge shall have power to proceed by himself to take measurements, and in that case these measurements shall be accepted by the contractor as final.

The contractor shall once in every month, submit to the Engineer with a copy to the concerned Engineer-in-Charge details of his claims for the work done by him up to and including the previous month which are not covered by his contract agreement in any of the following respects: -

- a) Deviation from the item and specification provided in the contract documents.
- b) Extra items / new items of the work.
- c) Quantities in excess of those provided in the contract agreement.
- d) Items in respect of which rates have not been settled, in addition furnish a clear certificate to the effect that the claims submitted by him as aforesaid cover all his claims and that no further claims shall be raised by him in respect of the work done up to and including the period under report.

3.2 FINAL BILLS:

As soon as possible after the completion of the work to the satisfaction of the Engineer-in-charge, the contractor shall forward a certified final account on BHEL forms in duplicate. It shall be accompanied with all abstracts; vouchers etc. in support thereof and shall be prepared, in the manner prescribed by the Engineer-in-Charge. No claims will be entertained after the receipt of the final bills.

The contractor shall be entitled to be paid the final sum less the value of payments already made on account subject to certification to the final bill by the Engineer-in-Charge. No charge shall be allowed to the contractor on account of the preparation of the final bills.

3.3 PAYMENTS OF BILLS:

The payment of final bill will be made only after successful proving. All payments to be made to the contractor under this contract shall be through online payment i.e., RTGS/ NEFT within a reasonable time after the certification by the Engineer-in-Charge.

3.4 RECOVERY FROM THE CONTRACTOR:

Whenever under the contract any sum of money shall be recoverable from or payable to the contractor, the same may be deducted from any sum then due or which at any time thereafter may become due to the contractor under the contract or under any other contract with BHEL or from his security deposit, or he shall pay the claim on demand.

3.5 POST TECHNICAL AUDIT OF WORK & BILLS:

BHEL reserves the right to carry out a post payment audit and technical examination of the work and bill including all supporting vouchers, abstracts etc. and to enforce recovery of any sums becoming due as a result thereof in the manner

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provided into the proceedings sub-paragraph provided, however, that no such recovery shall be enforced after three years of passing the final bills.

3.6 REFUND OF SECURITY DEPOSIT:

After expiration of the maintenance period, provided always that the contractor shall first have been paid final bill and have rendered a "No Demand" certificate, the security deposit mentioned *shall be released after satisfactory completion of the maintenance period of the work duly verified by Site In charge. The maintenance period of work is 3 months from the date of actual completion of work.*

3.7 ARBITRATION:

All disputes between the parties to the contract arising out of or relating to the contractor other than those for which the decision of the Engineer-in-Charge / Accepting Officer or any other person is by the contract expressed to be final and conclusive, shall after written notice by either party to the contract, the other party be referred to the sole arbitration of Unit Head or any other officer of BHEL in his sole discretion unless the parties otherwise agree, such reference shall not take place until after the completion, alleged completion or abandonment of the work or the determination of the contract. The venue of arbitration proceedings will be at Visakhapatnam. The arbitrator shall have the power to extend, from time to time, the time for making his award with the consent of the parties. The award of the Arbitrator shall be final, conclusive and binding on both the parties to the contract. Any matter arising out of or in connection with the agreement shall be under jurisdiction of Visakhapatnam court. The Head of HPVP Unit of BHEL, Visakhapatnam shall appoint the Arbitrator. No person other than a person so appointed shall act as Arbitrator.

3.8 IMPLEMENTATION OF PROVISION OF THE APPRENTICE ACT:

Contractor shall comply with the provisions of Apprentice Act-1961, and the Rules and Orders issued there under from time to time. If he fails to do so his failure will be a breach of the contract and the Accepting Authority may, in his discretion cancel the contract. The contractor shall also be liable for any pecuniary liability arising on account of any violation by him of the provision of the Act.

3.9 SAFETY AND SECURITY:

1. BHEL reserves the right to take penal action as deemed fit if any information provided by the vender / contractor is found to be incorrect.

2. Other safety related conditions:

- a) The contractor shall ensure proper safety of all the workmen, materials, plant and belonging to him or to BHEL or to others, working at or near the site. The contractor shall also be responsible for provision of all safety notices and safety equipment required both by the relevant legislation and the Engineer-in-charge as he may deem necessary.
- b) The contractor shall adopt adequate safety measures and use of protective clothing by all the workmen at site/work place whether engaged or not in actual of work or supervision thereof. The contractor shall ensure that the workmen on site use safety belt, gloves, helmets, masks etc. as are necessary for their safety.
- c) The contractor shall be responsible for safety arrangements of all equipment used in connection with the execution of the work and shall ensure employment of only trained person to operate the equipment. Only tested equipment, tools, wires, ropes etc. shall be used and shall periodically be tested to the satisfaction of the BHEL. All test certificates shall be made available to the BHEL at site as and when required.
- d) The contractor shall ensure provision and maintenance of lights, guards, fencing with gates and watching when and where necessary or required by the BHEL or by any one duly constituted authority for the protection of the work and / or for the safety and convenience of the public or others.
- e) The contractor shall take adequate safety precautions for prevention of accidents at site. The contractor shall also ensure that their employees / workmen comply with the statutory safety rules and regulations as and also those laid down by BHEL from time to time.
- f) The contractor shall provide at his cost necessary watch and ward force as may be approved by the BHEL to ensure security and safety of all buildings, structures, equipments and materials under their custody at the site of work.
- g) The contractor shall abide by all security regulations at site by the BHEL from time to time. The contractor shall provide identify badges to their personnel and workmen, which must be properly displayed by them at site.
- h) In order to facilitate issue of exit gate permits by the BHEL for materials and equipments either during execution or the maintenance period, the CONTRACTOR shall submit to the BHEL list of construction / erection equipment etc. and / or other materials that shall be taken by them inside the site from time to time. Such movement of materials, equipment, tools, tackles etc. shall be subject to certification by the Engineer-in-Charge.

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- i) The contractor and his personnel / workmen shall be subject to security check by BHEL's own security force or Central Industrial Security Force if engaged by the BHEL for the overall protection of the project.
- j) The contractor shall not allow any visitors on the works except with the written permission of the BHEL.
- k) From the commencement to the completion of work, the contractor shall take full responsibility for the care of the work, constructional plant and equipment and all temporary works and in case any damage or loss shall happen to the work, constructional plant and equipment or to plant temporary work from any cause whatsoever, the contractor shall at his own cost replace or repair and make good the same.
- l) The contractor will notify well in advance to the Engineer-in-charge of his intention to bring to site any container filled with liquid or gaseous fuel explosive or petroleum substance or such chemicals, which may involve hazards. The Engineer-in-charge shall have the right to prescribe the conditions under which such containers are to be stored, handled and used during the performance of the works and the contractor shall strictly adhere to and comply with such instructions. The Engineer-in-charge shall have to right at his sole discretion to inspect any such container or such construction plant / equipment, for which material in the container is required to be used and if in his opinion, its use is not safe, he may forbid its use. No claim due to such prohibition shall be entertained by BHEL nor shall BHEL entertain any claim of the contractor towards additional safety provisions/ conditions to be provided for/ constructed as per Engineer-in-Charge instructions compliance to statutory in respect of such conditions will be the sole responsibility of the contractor.
- m) Further any such decision of the Engineer-in-Charge shall not in any way absolve the contractor of his responsibilities for safety provisions and in case, use of such a container or entry thereof into the site area is forbidden by Engineer-in-Charge without any cost implications to BHEL or extension of work schedule.
- n) Where it is necessary to provide and/ or store petroleum products or petroleum mixtures and explosive, the contractor shall be responsible for carrying out such provision and / or storage in accordance with the rules and regulations laid down in Petroleum Act 1934, Explosives Act 1948 and Petroleum and Calcium Carbide Manual published by the Chief Inspector of Explosives of India. All such storage shall have prior approval of the Engineer-in-charge. In case, any approval is necessary from the Chief Inspector (Explosives) or other statutory authorities, the contractor shall be responsible for obtaining the same.
- o) All equipment used in construction & erection by the contractor shall meet Indian/ International Standards and where such standards do not exist, contractor shall ensure these to be absolutely safe. All equipment shall be strictly operated and maintained by the contractor in accordance with manufacturer's operation manual and safety instructions and as per guide lines/ rules of BHEL in this regard.
- p) Periodical examination and all tests for all lifting/ hoisting equipment and tackles shall be carried out in accordance with the relevant provisions of Factories Act 1948, Indian Electricity Rules 1910 and associated Law/ Rules in force from time to time. A register of such examinations and tests shall be promptly produced as and when desired by Engineer-in-charge or Safety Officer.
- q) Contractor shall provide suitable safety equipment of prescribed standard to all employees and workmen according to the need at his own cost as may be directed by Engineer-in-charge who will also have the right to examine these safety equipments to determine their suitability, reliability, acceptability and adoptability.
- r) The contractor shall provide safe working conditions to all workmen and employees at the site including safe means of access, railings, stairs, ladders, scaffolding, safety belts etc. the scaffoldings shall be erected under the control and supervision of an experienced and competent person.
- s) The contractor shall not interfere with or disturb electric fuses, wiring and other electrical equipment belonging to BHEL or other contractors under any circumstances whatsoever, unless specially permitted in writing by BHEL to handle such fuses, wiring or electrical equipment.

Before the contractor connects any electrical appliances to any plug or socket belonging to the other contractor or BHEL, he shall:

- i) Satisfy the Engineer-in-charge that the appliance is in good working condition.
- ii) Inform the Engineer-in-charge of the maximum current rating voltage and phases of the appliances.
- iii) Obtain permission of the Engineer-in-charge detailing the sockets to which the appliances may be connected.

The Engineer-in-charge will not grant permission to connect until he is satisfied that:

- i) The appliance is in good condition and is fitted with a suitable plug.
- ii) The appliance is fitted with suitable cable having two earth conductors, one of which shall be an earthed metal sheet surrounding the cores.

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- iii) No electrical cable in use by the contractor will be disturbed without prior permission. No weight of any description will be imposed on any cable and no ladder or similar equipment will rest against or attached to it.
- iv) No repair work shall be carried out on any live equipment, the equipment must be declared safe by the Engineer-in-charge and a permit to work shall be issued by Engineer-in-charge before any repair work is carried out by the contractor. While working on electric lines/ equipment whether alive or dead suitable type and sufficient quantity of tools will have to be provided by contractor to electricians/ workmen/ officers.
- t) The contractor shall employ necessary number of qualified full time electricians/ electrical supervisors to maintain his temporary electrical installations.
- u) In case any accident occurs during the construction/ erection or other associated activities undertaken by the contractor thereby causing any minor or major or fatal injury to his employees due to reason whatsoever, it shall be the responsibility of the contractor to promptly inform the same to BHEL Engineer-in-Charge in prescribed form. The contractor will be responsible for all pecuniary liability if any under such circumstances.
- v) The Engineer-In charge and Safety Officer shall have the right at his sole discretion to stop the work, if in his opinion, the work is being carried out in such a way that it may cause accidents and endanger the safety of the person and/ or property and/ or equipments. In such cases, the contractor shall also be informed in writing about the nature of hazards and possible injury/ accident and he shall remove the shortcomings promptly. The contractor after stopping the specific work can, if felt necessary, appeal against the order of stoppage of work to the respective General Manager within 3 days of such stoppage of work and decision of GM in this respect shall be conclusive and binding on the contractor.
- w) Notwithstanding anything contrary to this, in the event of his workmen, the contractor shall be required to fill Injury Report and submit to the Shop Manager/ Engineer-in-Charge of BHEL immediately and ensure due compliance of Workmen Compensation Act 1923 and Rules made there under.
- x) The contractor shall not be entitled to any damages/ compensation for stoppage of work due to safety reasons as provided above and the period of such stoppage of work will not necessarily be taken as an extension of time for completion of work and will not be the ground for waiver of levy of liquidated damages.
- y) The contractor shall follow and comply with all BHEL safety rules, relevant provision of applicable law pertaining to the safety of workmen, plant and equipment as may be prescribed from time to time without any demur protest or contest or reservation. In case of any unconformity between statutory requirement and BHEL Safety Rules referred above, the later shall be binding on the contractor unless the statutory provisions are more stringent.
- z) If the contractor fails in providing safe working environment as per the statutory requirements and / or BHEL Safety Rules or continue to work even after being instructed to stop the work by Engineer-in-charge or Safety Officer as provided above, the contractor shall promptly pay to BHEL, on demand, compensation at the rate of Rs. 500/- per day or part thereof till instructions are complied with and so certified by Engineer-in-charge/ Safety Officer. However, in case of accident taking place causing death/ injury to any individual the statutory provisions shall apply in addition to compensation mentioned in this para; and the contractor will be solely liable on account of this.

* * *

TOOLS AND TEST EQUIPMENTS

The following tools and equipment are required but not limited to for the erection and commissioning of instrumentation works to be arranged by the contractor.

DESCRIPTION

1. Pipe bending machines (5 mm to 25 mm)
2. Pipe wrenches (6",8",12")
3. Screw spanners (6",8",12")
4. Tap set for the above sizes
5. Set of screw drivers
6. Set of Allen keys
7. Set of spanners
8. Set of small files
9. S.S tube cutters
10. Tube bend for 1/2", 3.8", 1/2" SS tubing.
11. Small size hacksaw
12. Cutting pliers
13. Nose pliers
14. Insulation stripper
15. Die set 1/4", 1/2", 1 1/2 ", 2" ET
16. Tap set for the above sizes
17. Drill bits
18. Number punch
19. Alphabet punch
20. Embossing machine with cassettes (number and alphabet)
21. Portable drilling machine
22. Soldering gun, Soldering iron
23. Digital multimeter
24. Megger 1000 volts and 500 volts
25. Calibration kit for thermocouple
26. Continuity tester
27. Standard gauges for pneumatic instruments
28. Standard pressure gauges 0-2,0-4,0-10,0-16,0-25,0-100,0-160,0-250 Kg/cm²
29. Pneumatic calibration kit
30. Telephone set for cable testing
31. Hydraulic pump capable of generating 400 Kg/cm²
32. Dead weight tester
33. Universal watch makers screw driver set
34. Bay welding and cutting set with all accessories
35. Welding DC generator
36. Air filter regulator
37. 1/4" PVC tube of sufficient length
38. Output receiver gauge
39. Decade resistance box
40. Temperature bath
41. Calibration kit for generation and measurement of 4-20 mA DC signal.
42. 24 Volts Dc & 110 Volts AC power supply units.
43. Any other tool / equipment for testing instrument to be arranged by the contractor.

Ref: OS/SC/2023-24/155/92

Date: 05.03.2024

Sub: Service Contract for carrying out Electrical & Instrumentation Erection, Testing, Calibration, Loop checking and commissioning works for Fired Heater at GAIL USAR (S.O.7933).- Reg.

ACCEPTANCE TO TENDER TERMS & CONDITIONS

I / We hereby confirm that the Tender documents, all annexures etc. have been studied in detail and we have fully understood the scope of work.

I / We accept to all the Terms and Conditions of the Tender Enquiry and the prices quoted are in accordance with the same.

I / We accept to offer valid for a period of **3 months** from the last date for tender submission.

I / We give our acceptance to participate in Reverse Auction in case BHEL decides to go for reverse auction for this tender.

Tender documents duly signed on all the pages by the Owner / authorized representative of the bidder are attached herewith.

SIGNATURE OF TENDERER WITH SEAL

CONTRACTOR INFORMATION

Sl. No.	Particulars	To be Filled by Bidder
01.	Name of the Contractor	
02.	Nature of Firm / Concern (Proprietor/Partnership/Pvt. Limited/Public Ltd.) Note: In case of partnership concern, please enclose photo copies of the partnership deed	
03.	Full address	
04.	Name of the Proprietor/Partner	
05.	Name of the Person(s) and designation authorized for signing the contract/dealing with BHEL	
06.	Telephone No. of the firm	
07.	Fax No.	
08.	Mobile No.	
09.	E-mail ID	
10.	Organizational structure with name and designation	

SIGNATURE OF THE TENDERER WITH SEAL

Ref: OS/SC/2023-24/112/75**Date: 05.03.2024****CHECK LIST**

Sl. No.	Particulars	Document Enclosed (Yes / No)	Document No
01.	Name of the Contractor		
02.	Tender Document Signed & Stamped		
03.	PF Registration Certificate		
04.	ESI Registration Certificate		
05.	GSTIN Registration Certificate		
06.	PAN Number		
07.	Work orders & Job Completion Certificates in similar works as mentioned in eligibility criteria		
08.	Profit & Loss account and Balance Sheet certified by the Practicing Chartered Accountant for the last 3 years		
09.	Income tax returns for last three years (AY2021-22, 2022-23 & 2023-24)		
10.	HSN / SAC Code		
11.	MSE/UDYAM Registration		
12.	Cancelled Cheque/ NEFT Form		

SIGNATURE OF THE TENDERER WITH SEAL

ACCEPTANCE FOR ELECTRONIC FUND TRANSFER / RTGS / NEFT TRANSFER

01	NAME & ADDRESS OF THE SUPPLIER / SUBCONTRACTOR	
02	VENDOR CODE ASSIGNED BY BHEL,HPVP LTD	

DETAILS OF BANK ACCOUNT

03	NAME & ADDRESS OF THE BANK	
04	NAME OF THE BRANCH	
05	BRANCH CODE	
06	MICR CODE	
07	ACCOUNT NUMBER	
08	TYPE OF ACCOUNT	
09	BENEFICIARY'S NAME	
10	IFSC CODE OF THE BRANCH	
11	EMAIL ID	
12	TELEPHONE / MOBILE NUMBER	

CERTIFICATE

I / We here by agree to receive the payments due from M/s Bharat Heavy Electricals Ltd., by the National Electronic Fund Transfer / or RTGS Transfer mode by credit to my / our above mentioned Bank account. I / We also agree that payments made to the above mentioned account are a valid discharge of the liability of M/s Bharat Heavy Electricals Ltd. I / We also agree to bear the applicable Bank charges for the above mode of transfer. A copy of the Cheque leaf/ cancelled Cheque leaf of the above account is sent herewith.

(Authorized Signatories with Name & Seal)

BANKER'S CERTIFICATION

We confirm that we are enabled for receiving RTGS and NEFT credits and we further confirm that the account number of _____ (name of account holder), the signature of authorized signatory and the MICR and IFSC codes of our branch mentioned above are correct.

Place:

Bank Manager / Officer

Date:

Signature with Bank stamp and Name seal

FORWARDED TO ACCOUNTS DEPARTMENT / CASH SECTION

We confirm the above details are verified with the records available with us

Signature of BHEL Official with Name & Seal
Operating the contract / Services

GST COMPLIANCE FOR INDIGENOUS SUPPLIERS / CONTRACTORS

1. In Response to Tenders for Indigenous supplier will be entertained only if the vendor has a valid GSTIN which should be clearly mentioned in the offer. If any specific exemption is available, a declaration with due supporting documents need to be furnished for considering the offer.
2. Supplier shall mention their GSTIN in all their invoices and invoices shall be in the format as specified/prescribed under GST laws. Invoices shall necessarily contain Invoice number (in case of multiple numbering system is being followed for billing like SAP invoice no, commercial invoice no etc., then the Invoice No which is linked/uploaded in GSTN network shall be clearly indicated), item description as per PO, Quantity, Rate, Value, applicable taxes with nomenclature (like IGST, SGST, CGST & UTGST) separately, HSN/ SAC Code, etc.
3. All invoices shall bear the HSN Code for each item separately (Harmonized System of Nomenclature)/ SAC code (Services Accounting Code).
4. A declaration to the effect that all invoice particulars are/were uploaded in the GSTN network/ portal & all tax liability as per GST rules and regulations have been and will be discharged, shall be mentioned in the invoice. If not mentioned in the invoice, a separate declaration shall be submitted as per the requirement of BHEL.
5. All documents like Test Certificate, LR copy, Guarantee/Warranty certificate, work completion certificate, any other document mentioned in PO, shall be sent along with the vehicle/consignment where ever applicable. For all consignments received within the calendar month, input credit will be availed within that month in line with monthly returns filing cycle. In case of any discrepancy in the document or non-submission of documents mentioned in the PO, then BHEL will not be able to accept or account the material, in such case availing of tax credit will be deferred to next month or so.
6. In case of discrepancy in the data uploaded by supplier in the GSTN portal or in case of any shortages or rejection in the supply, then BHEL will not be able to avail the tax credit and will notify the supplier of the same. Supplier has to rectify the data discrepancy in the GSTN portal or issue credit note (details to be uploaded in GSTN portal) for the shortages or rejections in the suppliers, within the calendar month notified by BHEL.
7. For any such delay in availing of tax credit for reasons attributable to supplier (as mentioned above), interest (calculated @ SBI Base Rate + 6%) along with penalty if any will be deducted for the delayed period i.e. from the month of receipt till the month tax credit is availed, from the running bills.
8. Under GST regime, BHEL has to discharge GST liability on LD recovered from suppliers/contractors. Hence applicable GST shall also be recoverable from suppliers/contractors on LD amount. For this Debit note will be issued by BHEL indicating the respective supply invoice number.
9. This is to inform that GST portion of invoice, shall be released only upon Vendor declaring such invoice in his GSTR-1 and receipt of goods and Tax invoice by BHEL and Confirmation of payment of GST thereon by vendor on GSTN portal. Alternatively, BG of appropriate value may be obtained from vendor which shall be valid At least one month after the confirmation of date of payment of GST by vendor on GSTN portal and receipt of Tax invoice and receipt of goods, whichever is later. Above is subject to receipt of goods/service and tax invoice thereof along with vendor declaring invoice in his return and paying GST within timeline prescribed for availing ITC by BHEL.
10. That in case vendor delays Declaring such invoice in his 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 vendor/contractor along with interest levied/ leviable on BHEL.

Note: The above will be followed strictly for Processing vendor payments to ensure GST Compliance

PART – II

(PRICE BID)

Note:

- 1) The bidder shall quote the rates as per the schedule given below
- 2) **The quoted prices shall be fixed & firm without any escalation during the entire period of contract and till completion of the work.**
- 3) **L1 shall be evaluated based on the total price quoted at Sl. No:10.** Lowest offer need not be the rate acceptable to BHEL-HPVP. BHEL-HPVP reserves the right to go for negotiation with L1 bidder.
- 4) **Contractor shall quote prices as per Schedule of Quantities & Rates mentioned below.**
- 5) The quoted prices shall be **inclusive of GST** as applicable as on date of tender submission. However, GST as applicable shall be paid by contractor and same shall be reimbursed on submission of proof of payment along with the bill as per Annexure - GST.
- 6) Lighting poles, cable trays, lightning arrestor, earthing will have to be installed at elevation of 45 to 60m height from ground. As the heater height is up to 60m from ground, scaffolding as required shall be arranged by bidder suitably.
- 7) Lugs, ferrules, cable ties (for cable dressing) and other hardware like nuts, bolts shall be arranged by contractor suitably.
- 8) Works in Heater will be carried out at height of 45-60 mtrs from ground. Vendor to arrange scaffolding suitably.
- 9) Vendor to arrange shifting of material from stores to site and install suitably at site. Bidder to arrange for removal of scrap/left over material after carrying out the works to designated location as instructed by site engineer.
- 10) It is bidder's responsibility to arrange for all safety equipments required for execution of works at site
- 11) Stenciling shall be done for all the equipment after installation with due clearance from site engineer in line with the customer requirements. Materials for stenciling is in the scope of bidder.
- 12) The quantity indicated in the below schedule is indicative only and may increase/ decrease or be deleted but total value of contract will not exceed the awarded value, unless otherwise order is amended. However, payment shall be made for the actual quantity only.

SIGNATURE OF TENDERER WITH SEAL

**BHARAT HEAVY ELECTRICALS LIMITED
HEAVY PLATES & VESSELS PLANT
VISAKHAPATNAM – 530 012**

Name of Work: Service Contract for carrying out Electrical & Instrumentation Erection, Testing, Calibration, Loop checking and commissioning works for Fired Heater at GAIL USAR (S.O.7933). reg.

SCHEDULE OF QUANTITIES & RATES (SOQR)

ITEM NO	DESCRIPTION	UNITS	QTY	VALUE (Rs.)	
				Unit Rate(Rs.)	TOTAL(Rs.)
<u>A</u>	<u>INSTRUMENTATION WORKS:</u>				
1.0	Installation of the following instruments along with their accessories.				
1.1	Skin Type Thermocouples - Scope of Work includes : Installation, Loop Check & Reports	Nos	58		
2.0	ON LINE INSTRUMENTS Installation of the following on - Line Instruments is by Mechanical contractor. Identification and assistance to mechanical contractor if any, testing, stroke checking and calibration work as required by instrumentation contractor.				
2.1	Venturi Assembly - Scope of Work includes : Assistance for Installation of Venturi Assembly	Nos	2		
2.2	STACK INLET DAMPER - HV-1201 - Scope of Work includes : Assistance for installation of Damper Control Panel, accessories(Manual loader, Junction boxes) installation, Testing & Loop checking & Reports	Nos	1		
2.3	SAPH BYPASS AIR DAMPER - HV-1204- Scope of Work includes : Assistance for installation of Damper Control Panel, accessories(Manual loader, Junction boxes) installation, Testing & Loop checking & Reports	Nos	1		

Contd 2..

2.4	HOT AIR DISTN DAMPER - HA-4 - HV-1205 - Scope of Work includes : Assistance for installation of Damper control Panel, accessories(Manual loader, Junction boxes) installation, Testing & Loop checking & Reports	Nos	1		
2.5	FD FAN DISCH DAMPER - CA-1-SOB-3 - Scope of Work includes : Assistance for installation of Damper Control Panel, accessories(Manual loader, Junction boxes) installation, Testing & Loop checking & Reports	Nos	1		
2.6	COLD AIR DAMPER-CA-2 - SOB-4 - Scope of Work includes : Assistance for installation of Damper, Damper Panel, accessories(Manual loader, Junction boxes) installation, Testing & Loop checking & Reports	Nos	1		
3.0	PANELS Fabrication of structural support(free standing or wall mounted), Installation & grouting if necessary as per site engineer instruction. Scope includes Installation of panels , laying of cables, glanding , termination & loop checking as per drawing or site engineer instruction. Contractor also to Supply 6 AWG GI wire for earthing of BMS panels & Damper panels with <u>6 AWG G.I wire</u> to the nearest earth point				
3.1	SOOT BLOWER PLC - The System Consists Mainly following. A) Engineering cum Operation Station along with 21"Monitor and accessories - 1 Nos. B) System Cabinet: 1200mm(W) x 800 (d) x 2115 (h)- 1 Nos. C) Power distrubution board: 600(W) x 300 (d) x 1200 (h): - 1 No. Scope of Work: Fabrication & Installation of supports for SOOT BLOWER PLC, Installation of panels, Grouting if necessary as per site engineer instruction in the Control room. Testing of Panels, Loop checking of Panels, Earthing of panels , Cable Glanding & Routing of cables inside panel and Termination in Panel	Sets	1		

3.2	SOOT BLOWER LOCAL CONTROL PANEL - Scope of Work: Fabrication & Installation of supports for SOOT BLOWER LOCAL CONTROL PANEL, Installation of panels, Testing of Panels, Loop checking of Panels, Earthing of panels , Cable Glanding & Routing of cables inside panel and Termination in Panel	Nos	1		
3.3	FIDU PANEL - Scope of Work: Fabrication & Installation of supports for FIDU PANEL,PDB for FIDU, Installation of panels, Testing of Panels, Loop checking of Panels, Earthing of panels , Cable Glanding & Routing of cables inside panel and Termination in Panel	Nos	1		
3.4	VFD's for Motors - The System Consists Mainly following. B) System Cabinet: 800mm(W) x 600 (d) x 1200 (h)- 1 Nos. C) Power distrubution board: 600(W) x 300 (d) x 1200 (h): - 1 No. Scope of Work: Fabrication & Installation of supports for VFDs, Installation of panels, Grouting if necessary as per site engineer instruction in the Control room. Testing of Panels, Loop checking of Panels, Earthing of panels, Cable Glanding & Routing of cables inside panel and Termination in Panel	Sets	3		
4.0	BURNERS: Scope of Work: Installation & testing/ Loop checking including fabrication and erection of supports for Burner instruments & control items like spark type ignitor assembly (consisting of Control box,Ignition transformer,solenoid valves, Limit switches (if any) Flame scanners,Flame amplifiers etc.Scope also includes supply of bolts and nuts for erection and supply of 6 AWG G.I wire including earthing of panels/units with 6 AWG G.I wire to the nearest point.	Nos	21		

Ref: OS/SC/2023-24/155/92

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Date: 05.03.2024

4.1	MAINS OPERATED IGNITOR(TYPE&BURNER) with interconnecting cable(15 mtrs) to ignitor rod with its accessories. Scope of Work: Fabrication & Installation of supports of Ignitor control box, Installation , Testing & Loop checking, Earthing of Ignitor control box	Nos	1		
5	Cable work: For Clamping of cables, the necessary Aluminium strip of 25mm(W) x 3mm thk shall be supplied by Contractor. The necessary SS Tag plates shall be supplied by contractor. Supply of all consumables & Tools & Tackles is in contractor scope. Cable dressing shall be done by bidder by supplying Aluminium strips.				
5.1	12P X 1.5 MM2, OVERALL SHEATH BLACK cables Scope of Work: Meggering and laying of cables, Glanding, lugging,ferruling and termination of cables, Tagging with SS/Al plates on both sides, Clamping and dressing of cables	Mtrs	6300		
5.2	6P X 2.5 MM2, OVERALL SHEATH BLACK cables Scope of Work: Meggering and laying of cables, Glanding, lugging,ferruling and termination of cables, Tagging with SS/Al plates on both sides, Clamping and dressing of cables	Mtrs	500		
5.3	4C X 2.5 MM2, OVERALL SHEATH BLACK CABLE Scope of Work: Meggering and laying of cables, Glanding, lugging,ferruling and termination of cables, Tagging with SS/Al plates on both sides, Clamping and dressing of cables	Mtrs	3000		
5.4	3C X 4 MM2, OVERALL SHEATH BLACK cables Scope of Work: Meggering and laying of cables, Glanding, lugging,ferruling and termination of cables, Tagging with SS/Al plates on both sides, Clamping and dressing of cables	Mtrs	500		

Contd 5..

6.0	Cable Tray Work: Scope of Work: Installation of supports and laying of following cable trays along with covers and coupler plates as required. The scope of work includes fabrication and installation of supports with structural steel at an interval of 1 meter for cable trays, bends hangers, fit up, welding/ bolting as required. (Note:-Nuts & bolts with washers for fixing coupler plates shall be supplied by BHEL).				
6.1	300mm(W) GI cable tray	Mtrs	250		
6.2	100mm(W) GI cable tray	Mtrs	400		
6.3	50 mm(W) GI cable tray	Mtrs	300		
7.0	Painting: Sand blasting shall be done for all the structural material before erection. Painting of all the structural steels works (Listed below) including Wire brushing/ cleaning of surface area, 2 coats of primer, 2 coats of Paint (as per site engineer instruction and as per applicable GAIL/EIL standards) for all structural work / supports. (Note : color of paint will be indicated by site engineer during execution.)				
7.1	MS Angles: (size: 75x75x6mm) & 50 x 50 x 6 - Scope of Work: Supply of primer(2-coats) + First coat of Paint, Labour charges for primer(2-coats) + First coat of Painting, Supply of 2nd & Final coat of paint, Labour charges for 2nd & Final coat of Painting	Mtrs	1200		
7.2	MS Channel : (size: ISMC 100) Scope of Work: Supply of primer(2-coats) + First coat of Paint, Labour charges for primer(2-coats) + First coat of Painting, Supply of 2nd & Final coat of paint, Labour charges for 2nd & Final coat of Painting	Mtrs	200		

Contd 6..

7.3	MS Plate : (size: 6mm or 8mm Thk) Scope of Work: Supply of primer(2-coats) + First coat of Paint, Labour charges for primer(2-coats) + First coat of Painting, Supply of 2nd & Final coat of paint, Labour charges for 2nd & Final coat of Painting	Sq. Mtrs	30		
8.0	Canopy Installation of the Canopies (Supplied by others) for Field Instruments ,Junction boxes, LCP's etc. as per site engineer instruction.Supply of anchor fasteners, U clamps, Bolts,nuts etc.as required is in the scope of contractor and the same shall be included in the unit rate.	Nos	12		
9.0	Testing & Commissioning Assistance Instrument Contractor shall provide following man power during precommissioning & Commissioning of Plant with required tools and tackels etc., Note: The above rates shall also be applicable to carryout unspecified works,if any, on basis of man power .				
9.10	Technician	Man days	45		
9.20	Electrician	Man days	60		
9.30	Fitter	Man days	30		
9.40	Welder	Man days	30		
9.50	Helper	Man days	90		
<u>B</u>	<u>ELECTRICAL WORKS:</u>				
1	Installation of LCS for Blower fan motor(FLP) on pedestal, glanding, termination, testing and commissioning. Pedestal to be fabricated.All hardware/accessories required shall be form part of the scope of contractor. Required MS channel/Angles will be supplied by BHEL for manufacturing part.	Nos	3		

Ref: OS/SC/2023-24/155/92

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Date: 05.03.2024

2	Glanding , termination ,testing and commissioning of 90KW motors-02Nos, 110KW-01Nos. Suitable cu lugs to be supplied by contractor.	Nos	3		
3	Equipment earthing includes earthing of all structures with in package battery limit, piping, electrical equipments like motors, local panels, LCS, cable trays, etc. and connecting to the earth strip.				
3.1	Installation of 50 x 6 mm /40x5 G.I Strip. Earth pits-03 Nos to be made at site using above material supplied. Other consumables such as coal and salt shall be arranged by bidder suitably. Copper electrodes required for Earth pit shall be arranged by bidder suitably.	Mtr	2500		
3.2	installation of 8 SWG G.I wire(above ground)	Mtr	3000		
3.3	installation of 25 x3 mm G.I Strip. Strip for earthing of motors,electrical equipment and further connection to nearest grid.	Mtr	200		
3.4	Installation of 3/8" DIA GI FINE WIRE ROPE	Mtr	1200		
3.5	Installation of Lightning arrestor	Set	1		
4	Lighting				
4.1	Installation, glanding, termination, testing and commissioning of FLP lighting fixtures with lamps. Scope includes fabrication of brackets to suit site conditions with supply of u-clamps and other required hardware. Well glass luminaries'45W (FLP) with separate control gear box shall be supplied by BHEL. Gear box shall be mounted on structures/pipes racks etc.	Nos	245		
4.2	Installation of Lighting poles Hot dip galvanized *	Nos	150		
4.3	Installation , Testing and commissioning of Lighting PDB 240 VAC-1 No. and Lighting PDB 220 VDC-1 No.	Set	1		
4.4	Installation , Testing and commissioning of UPSPDB 110 VAC-1No.	Set	1		

Contd 8..

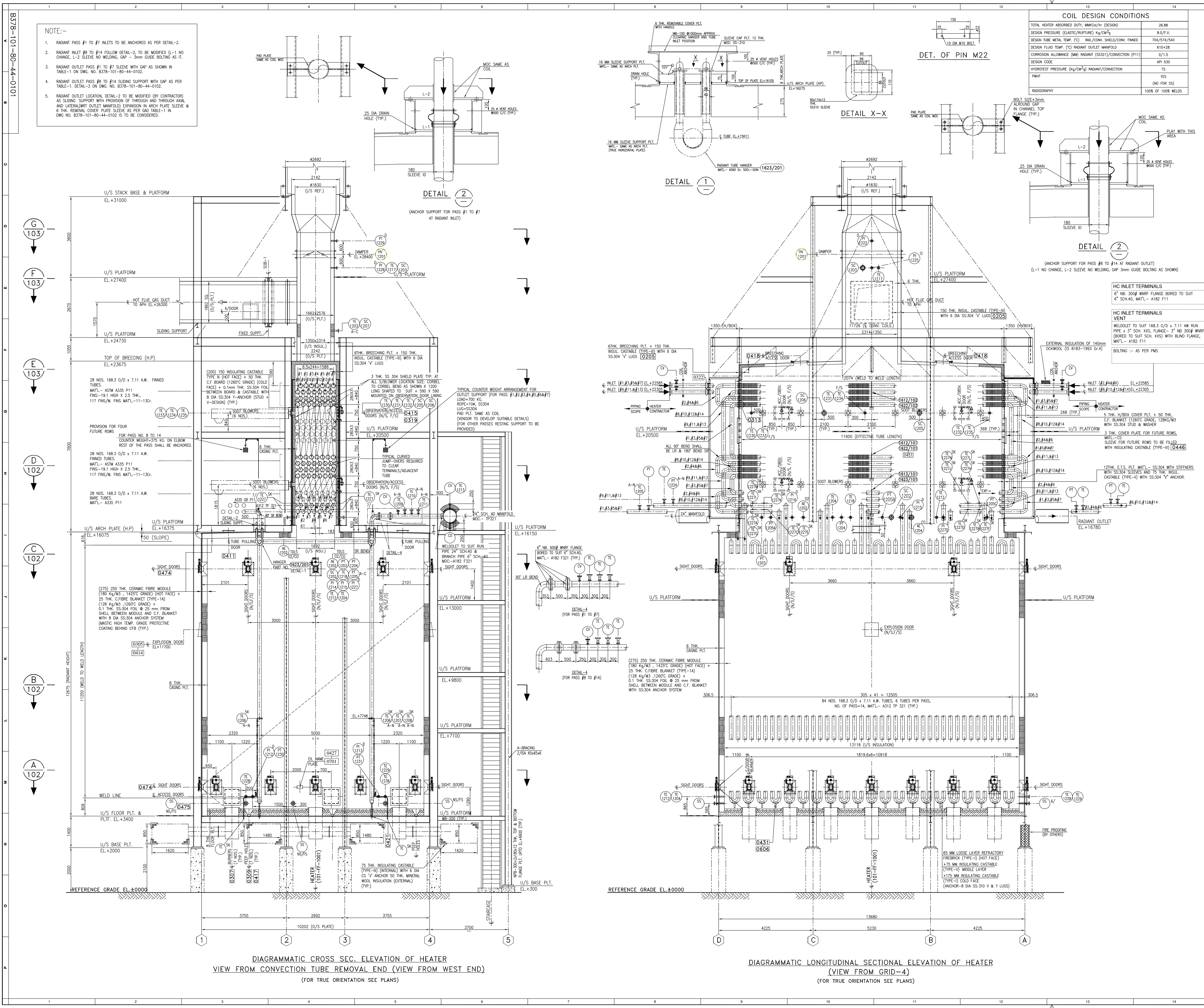
Ref: OS/SC/2023-24/155/92

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Date: 05.03.2024

5	PANELS Fabrication of structural support(free standing or wall mounted), Installation & grouting if necessary as per site engineer instruction. Scope includes Installation of panels , laying of cables, glanding , temination & loop checking as per drawing or site engineer instruction. . Contractor also to Supply 6 AWG GI wire for earthing of BMS panels to the nearest earth point				
5.1	LIGHTING PDB, NON UPS PDB, DC PDB Scope of Work: Fabrication & Installation of supports for Lighting PDB, Installation of panels Testing of Panels, Loop checking of Panels, Earthing of panels, Cable Glanding, Routing of cables inside panel and Termination in Panel	Nos	3		
6	Installation, testing of 3PHASE FLAME PROOF WELDING RECEPTACLES, Convenience sockets, Hand Lamps with accessories in the field.	Sets	23		
7	Installation, testing and commissioning of Aviation Lamps along with accessories. Each set containing 2 Nos of LED lamps.	Sets	6		
8	Total				
9	GST @____%				
10	Total Price Including GST (Same price to be entered in GeM portal)				

SIGNATURE OF THE TENDERER WITH SEAL



NOTE:-

- RADIANT PASS #1 TO #7 INLETS TO BE ANCHORED AS PER DETAIL-2.
- RADIANT INLET #8 TO #14 FOLLOW DETAIL-2, TO BE MODIFIED (L-1 NO CHANGE, L-2 SLEEVE NO WELDING, CAP - 3mm GUIDE BOLTING AS IT).
- RADIANT OUTLET PASS #1 TO #7 SLEEVE WITH CAP AS SHOWN IN TABLE-1 ON DWG. NO. B378-101-80-44-0102.
- RADIANT OUTLET PASS #8 TO #14 SLIDING SUPPORT WITH CAP AS PER TABLE-1, DETAIL-3 ON DWG. NO. B378-101-80-44-0102.
- RADIANT OUTLET LOCATION, DETAIL-2 TO BE MODIFIED (BY CONTRACTOR) AS SLIDING SUPPORT WITH PROVISION OF THROUGH AND THROUGH AXIAL AND LATERAL/OUTLET MANIFOLD EXPANSION IN ARCH PLATE SLEEVE & 6 THK. REMOVAL COVER PLATE SLEEVE AS PER CAP TABLE-1 IN DWG NO. B378-101-80-44-0102 IS TO BE CONSIDERED.

COIL DESIGN CONDITIONS	
TOTAL HEATER ABSORBED DUTY, MW/CH/HR (DESIGN)	26.88
DESIGN PRESSURE (ELASTIC/RUPURE) Kg/cm^2	8.0/7.4
DESIGN TUBE METAL TEMP. (°C) RAD./CONV. SHIELD/CONV. FINED	704/514/540
DESIGN FLUID TEMP. (°C) RADIANT OUTLET MANIFOLD	610+28
CORROSION ALLOWANCE (MM) RADIANT (SS321)/CONVECTION (P11)	0/1.5
DESIGN CODE	API 530
HYDROTEST PRESSURE (Kg/cm^2) RADIANT/CONVECTION	75
PAINT	YES
	(NO FOR SS)
	100% OF 100% WELDS

REF. DWG. NO.	REFERENCE DRAWING TITLE
B378-101-16-43-0000	EQUIPMENT LAYOUT FOR PCH UNIT
B378-101-80-44-1100	FOUNDATION LAYOUT PLAN
B378-101-80-44-0102	GENERAL ARRANGEMENT PLAN-1
B378-101-80-44-0103	GENERAL ARRANGEMENT PLAN-2
B378-101-80-44-1104	GENERAL ARRANGEMENT STACK
B378-101-80-44-1105	TUBE SUPPORT CASTINGS
B378-101-80-44-0106	API SYSTEM DUCTING LAYOUT PLAN
B378-101-80-44-0107	API SYSTEM DUCTING LAYOUT ELEVATION
B378-101-80-44-0108	API SYSTEM DUCTING LAYOUT ELEVATION
B378-101-80-44-0109	MAIN MEMBER STRUCTURE CONFIGURATION-ELEVATION
B378-101-80-44-0110	GENERAL NOTES

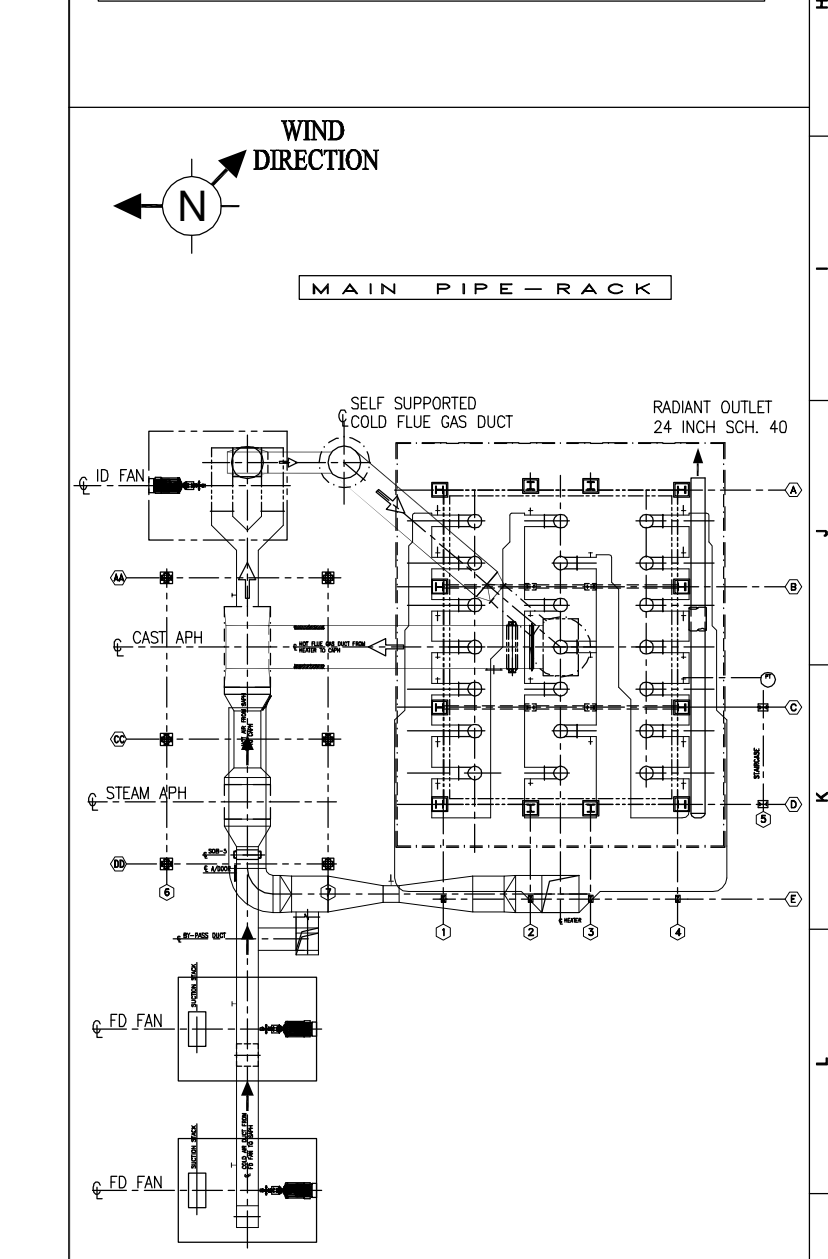
- NOTES:-
- ALL NOTATIONS:-
 - SECTION PLANS OR DETAILS.
 - CROSS REFERENCE DRG. NO. IF LEFT BLANK, DENOTES DETAIL APPEARS ON SAME DRAWING SHEET.
 - DENOTES PART NO.
 - DENOTES COLUMN GRID NO.
 - DENOTES AUXILIARY CONNECTIONS.
 - DENOTES STANDARD DRAWING NO.
 - DENOTES GRATING MAIN BAR SPAN.
 - SLIDING SUPPORT.
 - FIXED SUPPORT.
 - RESTING SUPPORT.
 - ALL DIMENSIONS ARE IN MM.
 - DO NOT SCALE DRAWING ASK IF IN ANY DOUBT.

SKIN THERMOCOUPLE DETAILS.	
TAG NO.	LOCATION
11227 - A TO N	CONNECTION BOTTOM MOST SHOCK TUBES
11206 - A TO N	5TH TUBE FROM RADIANT OUTLET
11207 - A TO N	3RD TUBE FROM RADIANT OUTLET
11208 - A TO N	AT RADIANT OUTLET

ALL INSTRUMENT TAG NOS SHALL BE PRE FIXED WITH "1".
Eg. TE-1228 SHOULD BE READ AS TE-11228.

HOLDS:- (TO BE REMOVED BY HEATER CONTRACTOR)

- FLOOR CUTOUTS (BURNERS, PEEP HOLES, SKIN THERMOCOUPLE LOCATION, WASTE GAS NOZZLE LOCATION).



REVISIONS		BY	CHKD	APPD	PERM
0	18.05.2022	ISSUED FOR ENGINEERING	MB	AV	RP
1	27.01.2022	ISSUED FOR ENGINEERING	MB	AV	RP
2	07.01.2022	ISSUED FOR BIOS/COMMENTS	MB	AV	RP
3	10.09.2021	ISSUED FOR BIOS/COMMENTS	MB	PKA/AV	RP

REVISIONS

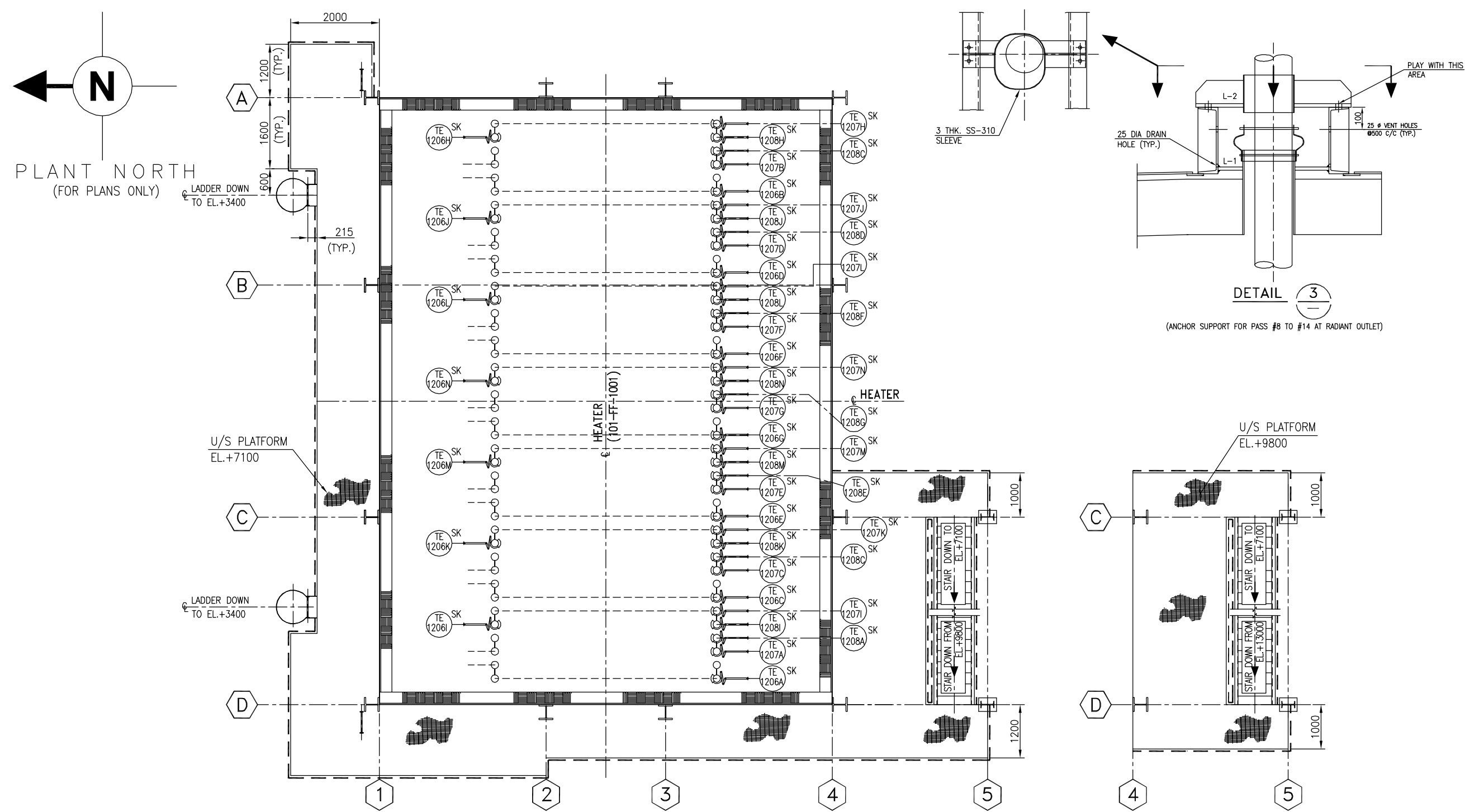
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JOB NO.	B37810101
UNIT	1
DIVN.	8
DEPT.	04
DWG. NO.	101010
REV.	0

500 KTA PCH - PP PROJECT
USAR, MAHARASHTRA, INDIA

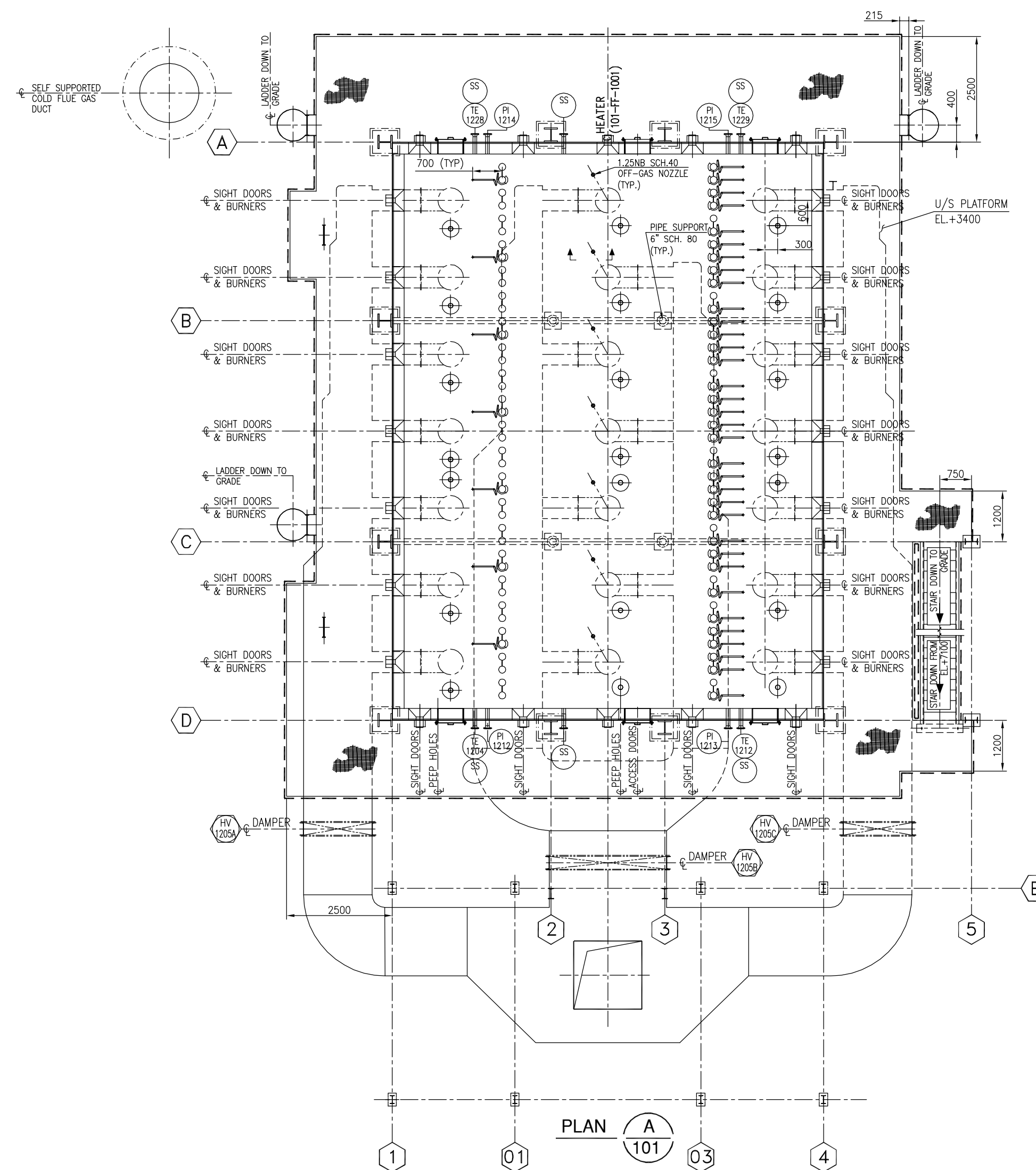
GENERAL ARRG. CROSS SEC. & LONG. SEC. REACTOR CHARGE HEATER (101-F-1001)

प्रमाणित की गई है कि यह दस्तावेज़ इंजीनियरिंग डिजाइन के अंतर्गत तैयार किया गया है और इसका उपयोग केवल उद्देश्य के लिए ही होना चाहिए।
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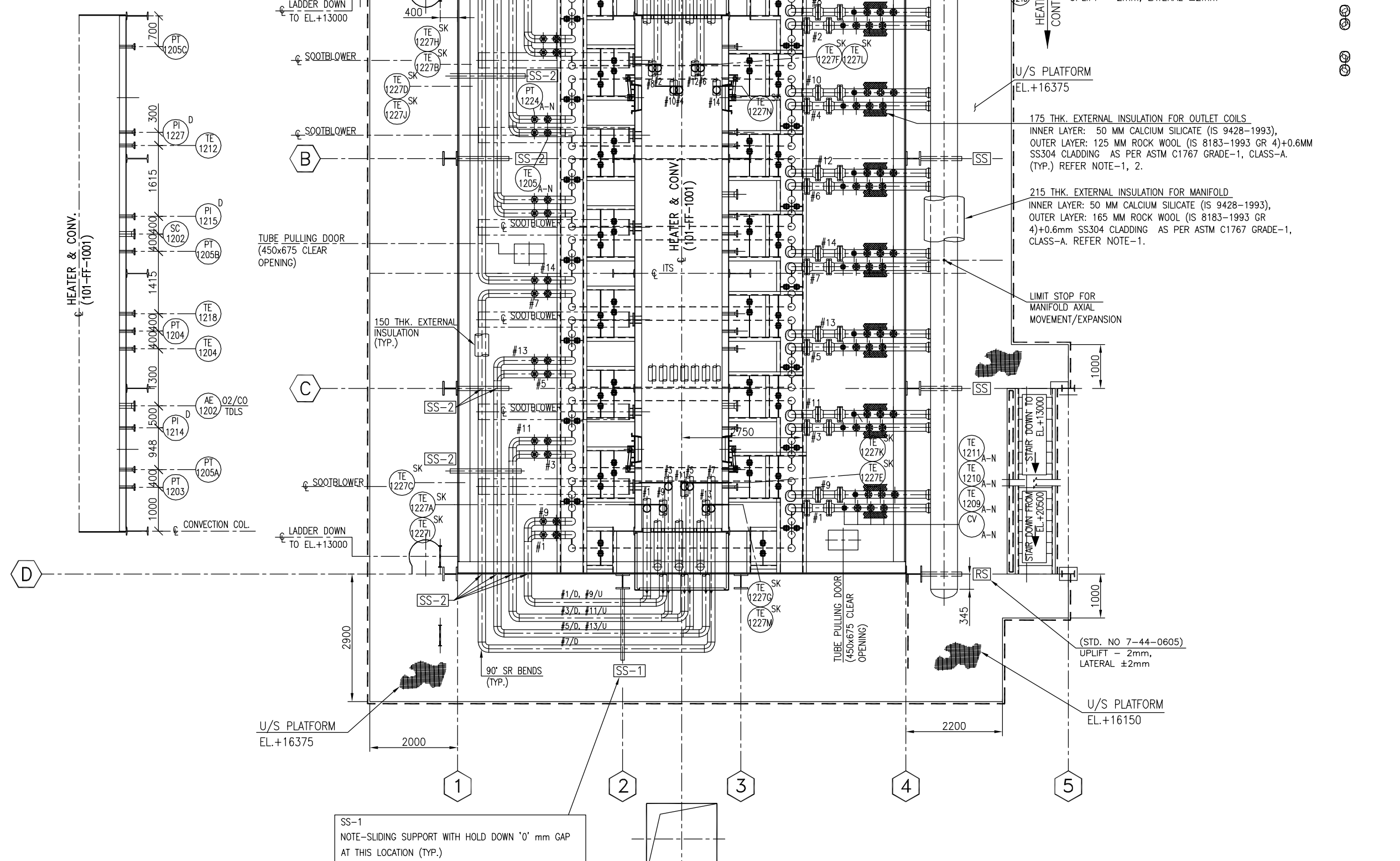
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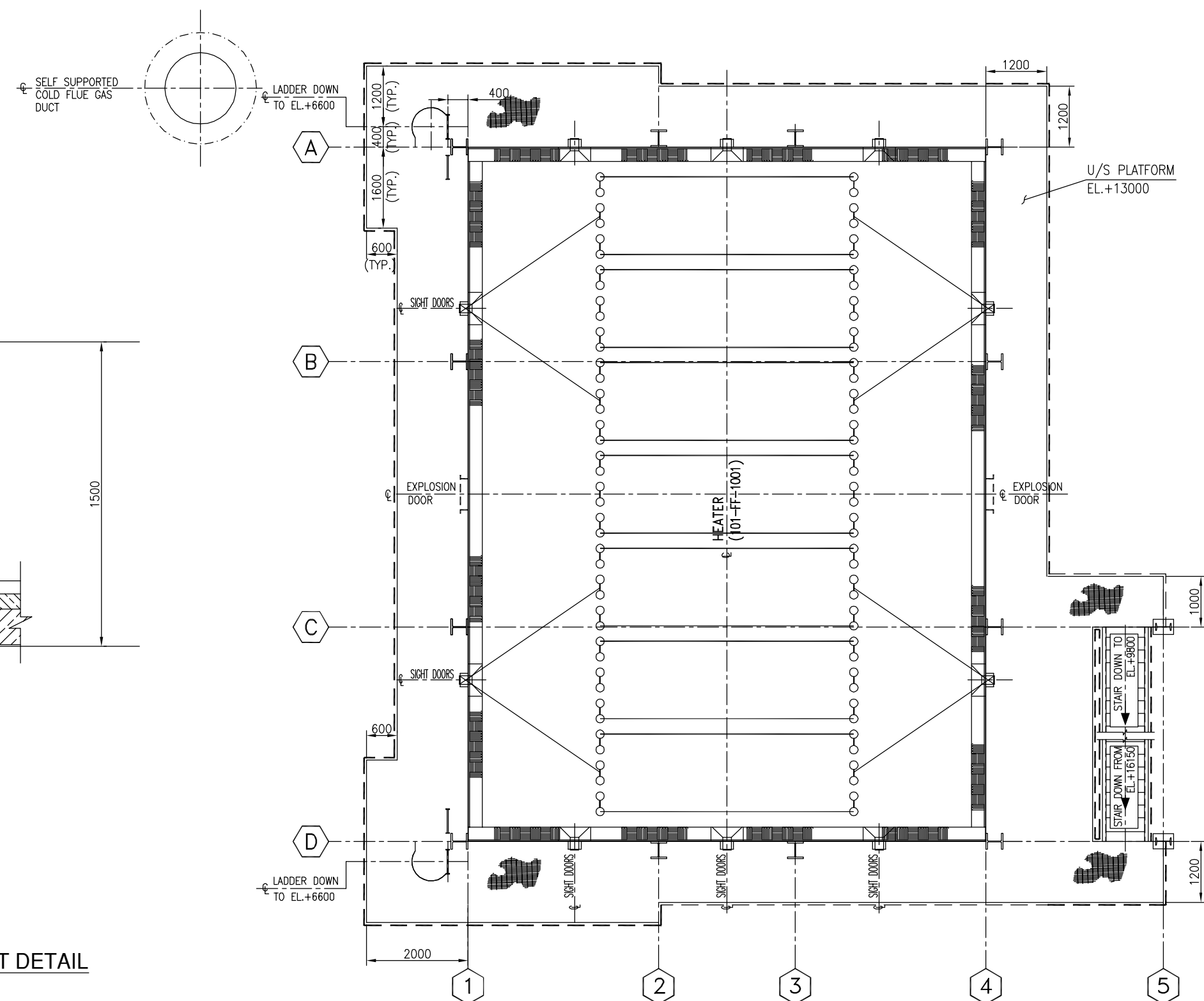
PLAN B
101



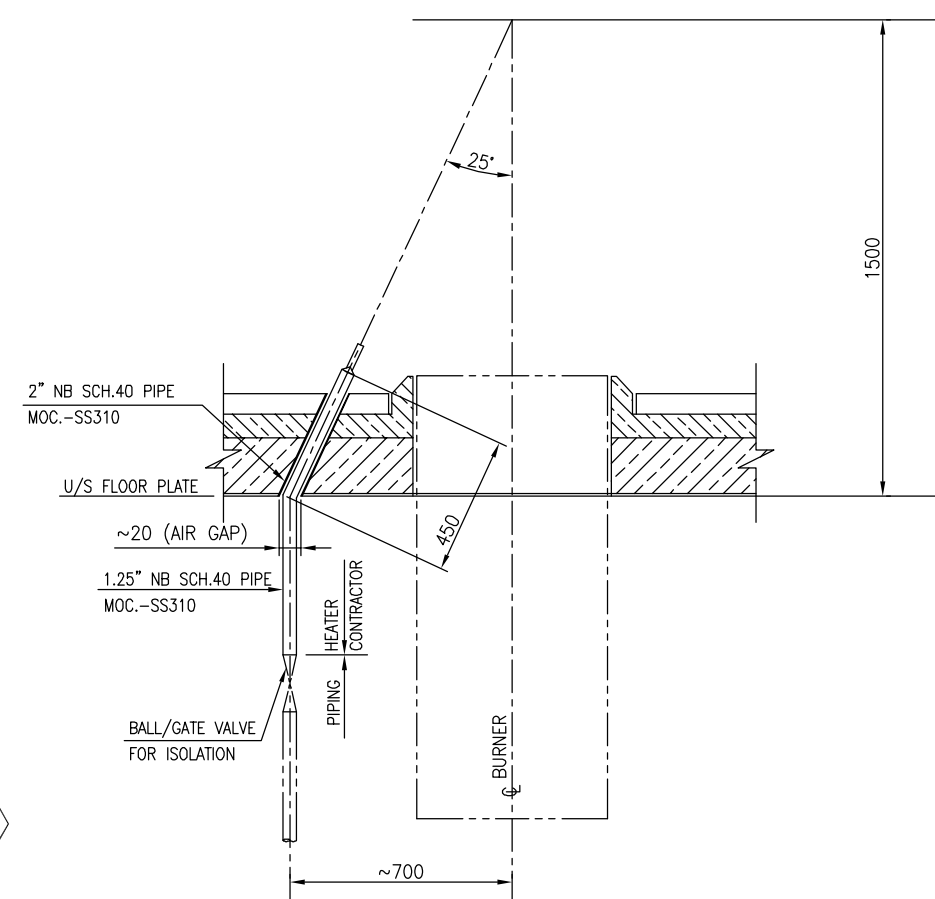
PLAN A
101



PLAN D
101

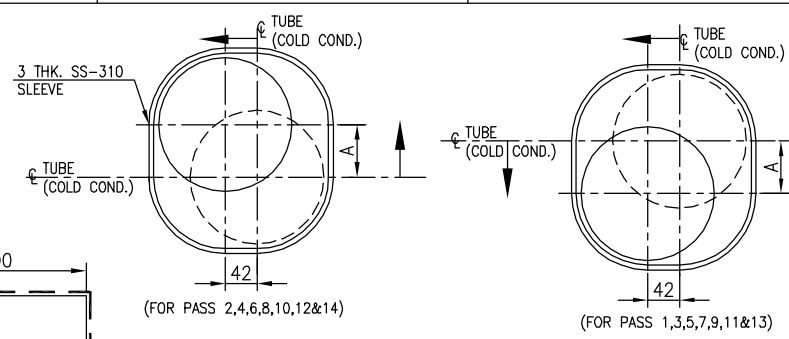


PLAN C
101



WASTE GAS FIRING ARRANGEMENT DETAIL

RADIANT OUTLET SLEEVE SLOT DETAIL AT ARCH TABLE-1	
PASS NO	'A'
PASS #1,#2,#8		66
PASS #3,#4,#10	45
PASS #5,#6,#12	23
PASS #7 & #14	2

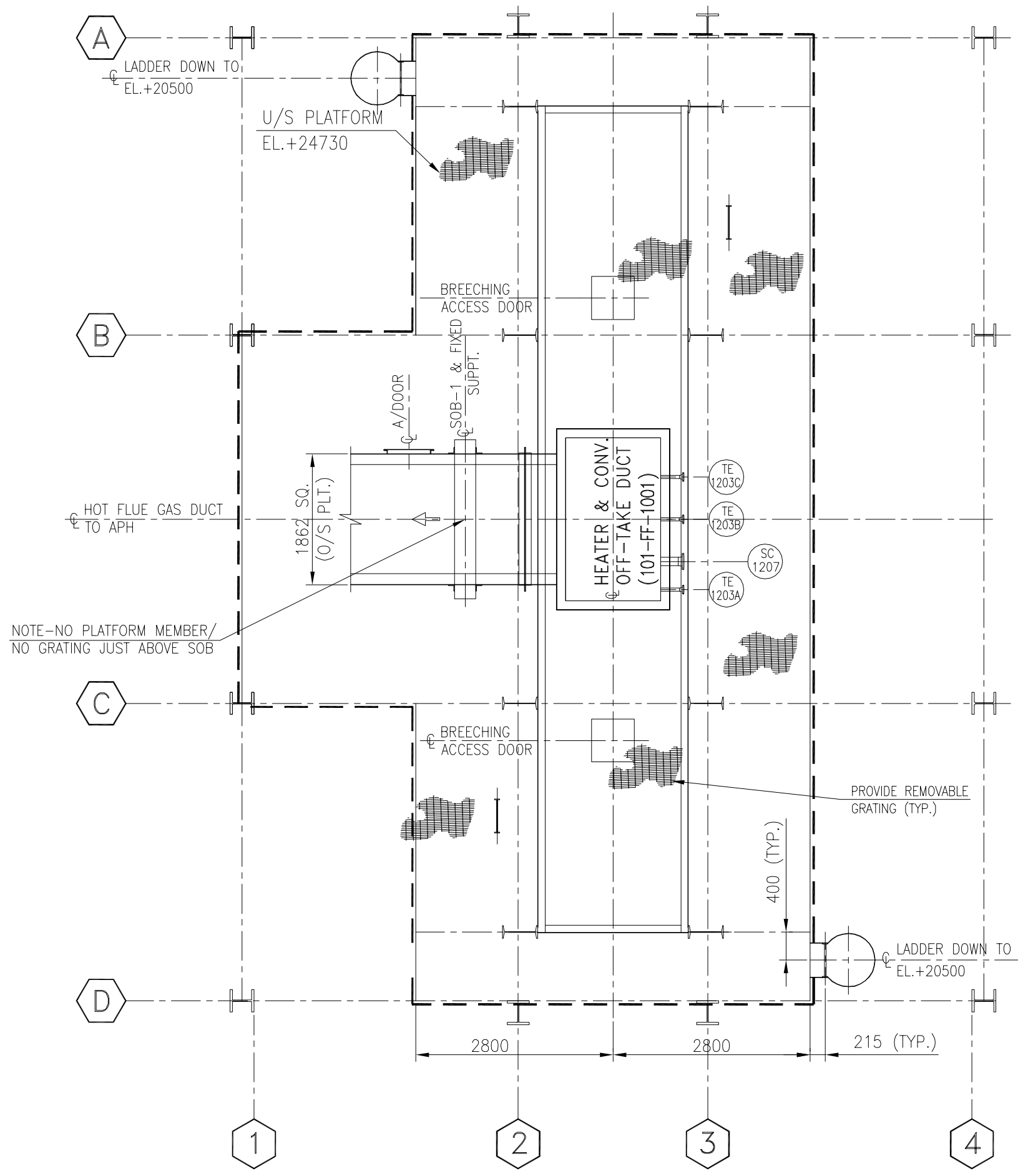
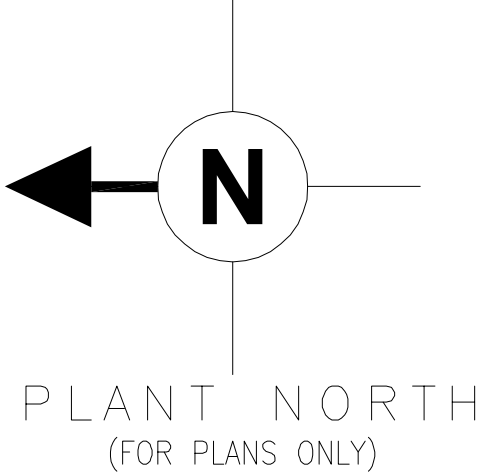


REF. DWG. NO.	REFERENCE DRAWING TITLE
B378-101-80-44-0101	GENERAL ARRANGEMENT CROSS SECTION & LONGITUDINAL SECTION
NOTES :-	
1.	OF BLANKET SHALL BE INHIBITED FOR CALORIFIC LEVEL LESS THAN 109PM. A 0.15MM THK SS FOL WRAP OVER THE PIPING / MANHOLE TO AVOID DIRECT CONTACT OF THE INSULATION TO STAINLESS STEEL SUBSTRATE.
2.	THE CONTRACTOR SHALL PROVIDE A METHOD(S) FOR SUPPORTING THERMALBLANKET INSULATION TO PREVENT EXCESSIVE SAGGING, PARTICULARLY ON VERTICAL LINES.

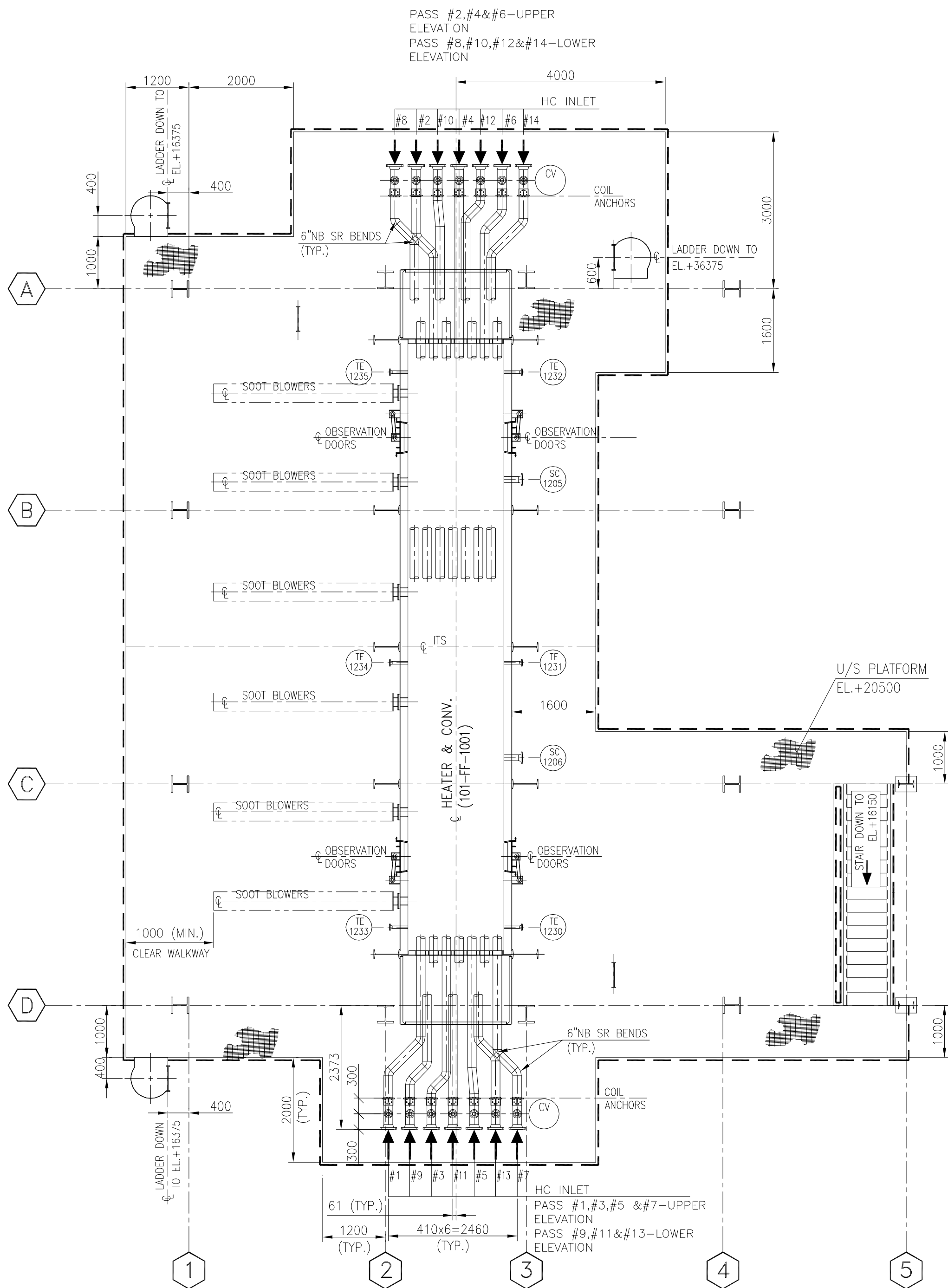
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C	27.01.2022	ISSUED FOR ENGINEERING	MB	AV	RP	
B	07.01.2022	ISSUED FOR BIDS/COMMENTS	MB	AV	RP	
A	10.09.2021	ISSUED FOR BIDS/COMMENTS	MB	PK/AV	RP	
REV.	DATE	REVISIONS	BY	CHKD	APPD	P

  ENGINEERS INDIA LIMITED (A Govt. of India Undertaking)									
		गैल इंडिया लिमिटेड GAIL (INDIA) LIMITED USAR, MAHARASHTRA							
500		डेटोईल पीपीचर्ज पोषी परपोजेना उच्च महाराष्ट्र				500 KTA PDH – PP PROJE USAR, MAHARASHTRA INDIA			
		डेटोईल पीपीचर्ज पोषी परपोजेना उच्च महाराष्ट्र				GENERAL ARGGT. PLAN-I REACTOR CHARGE FLEAT-1 (101-FT-1001)			
SCALE		JOB NO		UNIT		DIVN. DEPT		DWG. NO.	
1:66.6		8	3	7	8	1	0	1	0

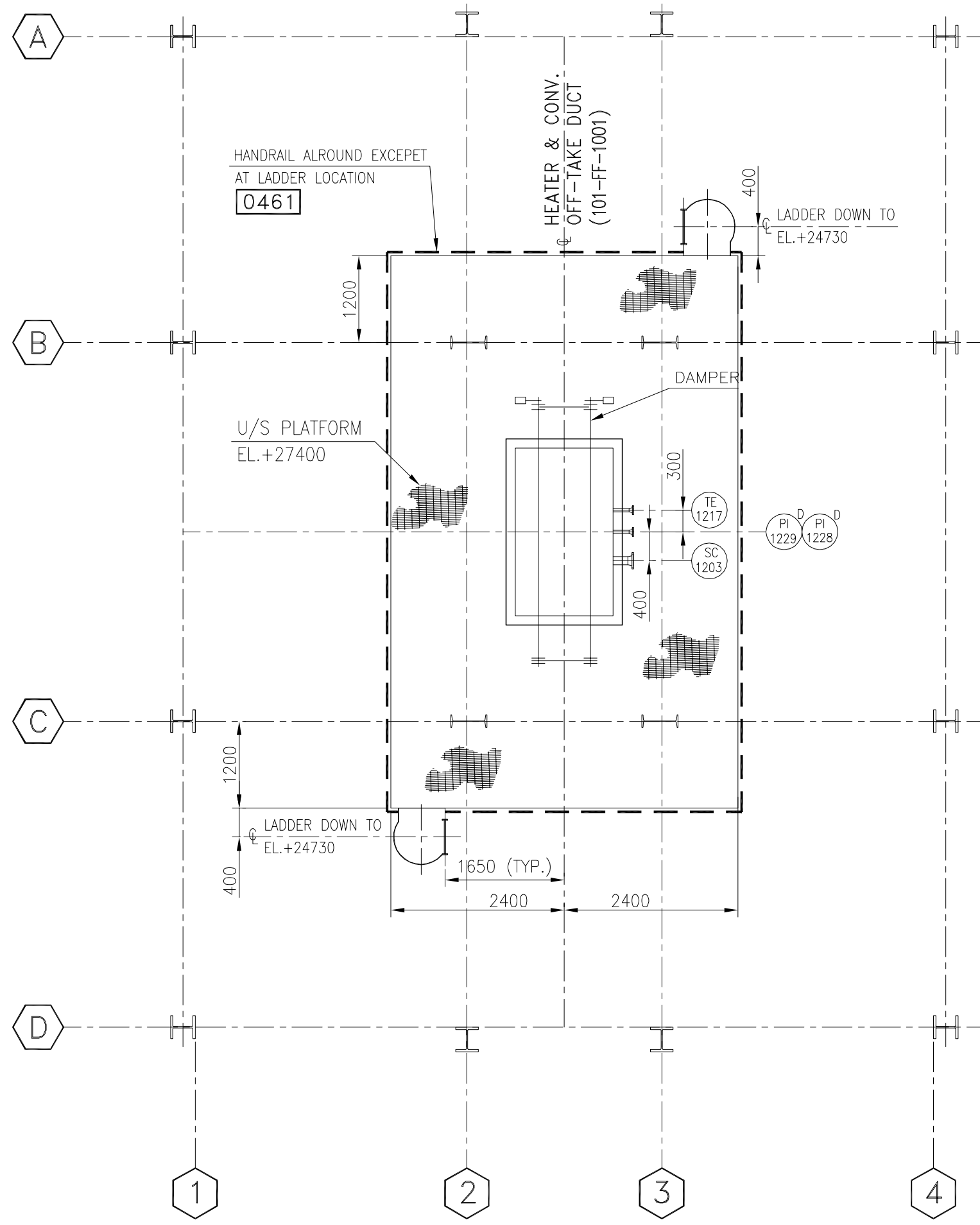
प्रस्तुत आरेख एवं उसके निर्माण विवरण इंजीनियरिंग दस्तावेज के अंग हैं। ये आरेख आमतौर पर प्रयोग के लिए हैं और उनका उपयोग केवल उद्देश्य के लिए ही किया जाना चाहिए।
आरेख तैयार करने वाले इंजीनियर के अधिकार क्षेत्र के अंतर्गत है।
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PLAN F 101



PLAN E 101



PLAN G 101

REF. DWG. NO.	REFERENCE DRAWING TITLE
B378-101-80-44-0101	GENERAL ARRANGEMENT CROSS SECTION & LONGITUDINAL SECTION
B378-101-80-44-0102	GENERAL ARRANGEMENT PLAN-I

NOTES :-

REV.	DATE	REVISIONS	BY	CHKD	APPD	REMARKS
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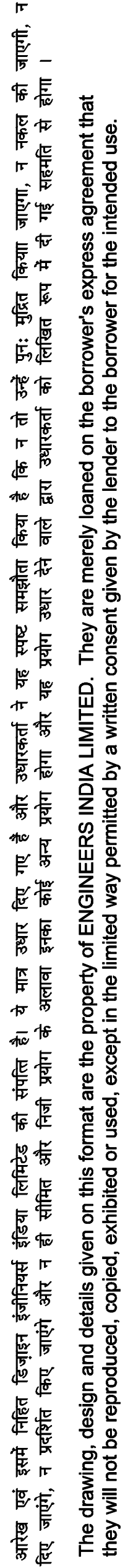
B	19.05.2022	ISSUED FOR ENGINEERING	MB	AV	RP	
C	27.01.2022	ISSUED FOR ENGINEERING	MB	AV	RP	
B	07.01.2022	ISSUED FOR BIDS/COMMENTS	MB	AV	RP	
A	10.09.2021	ISSUED FOR BIDS/COMMENTS	MB	PK/AV	RP	

गैल इंडिया लिमिटेड GAIL (INDIA) LIMITED USAR, MAHARASHTRA						

500 कैंटीन पीडोपच पीवी परीपोजन उषार महाराष्ट्र भारत	500 KTA PDH - PP PROJECT USAR, MAHARASHTRA INDIA
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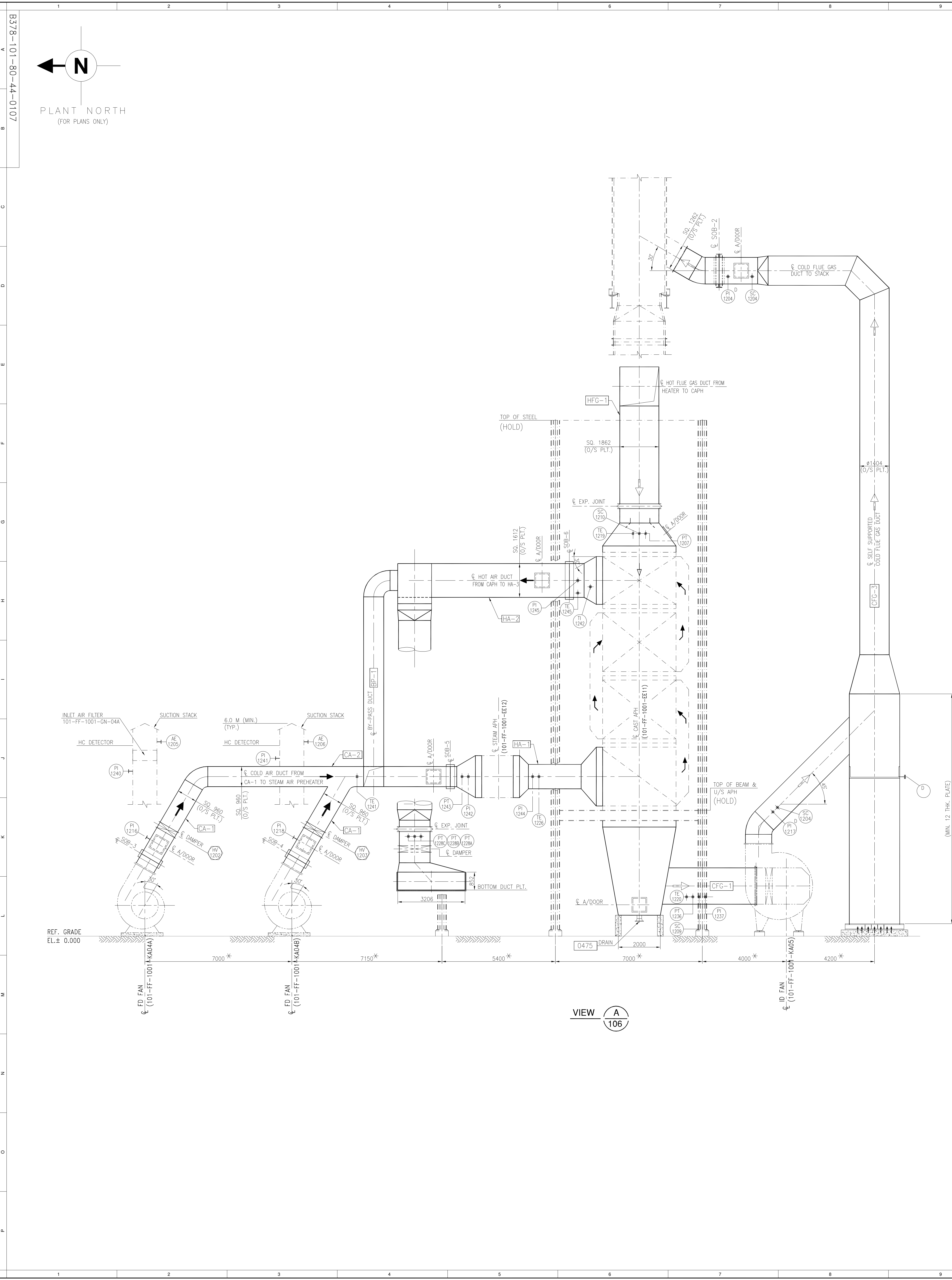
कैंटीन पीडोपच पीवी परीपोजन उषार महाराष्ट्र	GENERAL ARRANGEMENT PLAN-II
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SCALE	JOB NO.	UNIT	DIVN	DEPT	DWG. NO.	REV.
1:56.6	B 3 7 8 1 0 1		8 0 4 4 0 1 0 3 0			

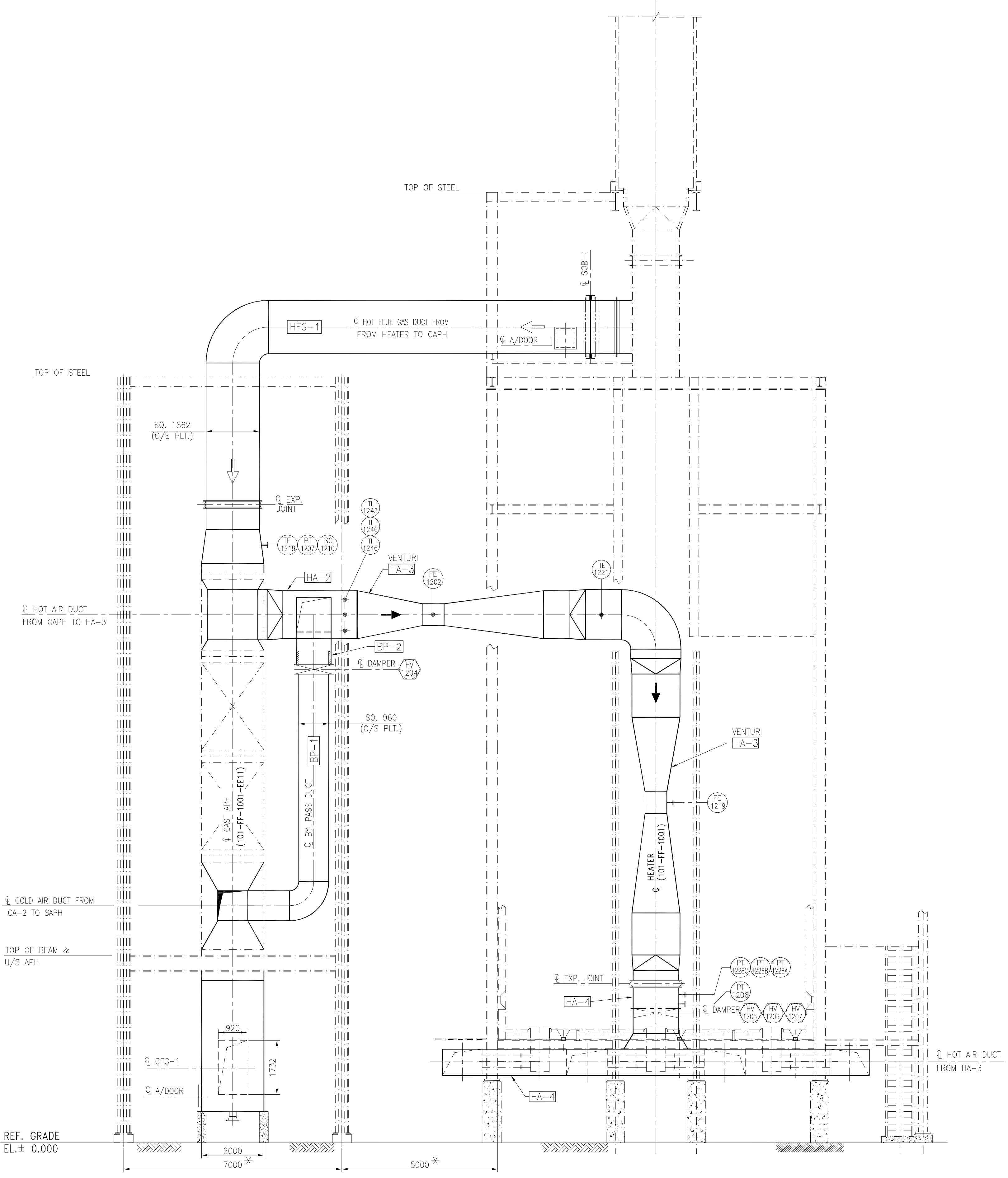
[illegible]

प्रस्तावित आरेख को इस रूप में प्रस्तुत किया गया है कि यह केवल एक संकेतक है और इसमें कोई भी गारंटी नहीं दी जाती है कि यह वास्तविक स्थिति को सटीक रूप से दर्शाता है।
इस आरेख में प्रदर्शित सभी माप और विवरण आरेखी द्वारा प्रदान किए गए हैं और इन पर किसी भी प्रकार की गारंटी नहीं दी जाती है।
यदि किसी भी कारणवश इस आरेख में त्रुटि पाई जाती है, तो इसे तुरंत सही कर दिया जाएगा।
यदि किसी भी कारणवश इस आरेख में त्रुटि पाई जाती है, तो इसे तुरंत सही कर दिया जाएगा।

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VIEW A
106



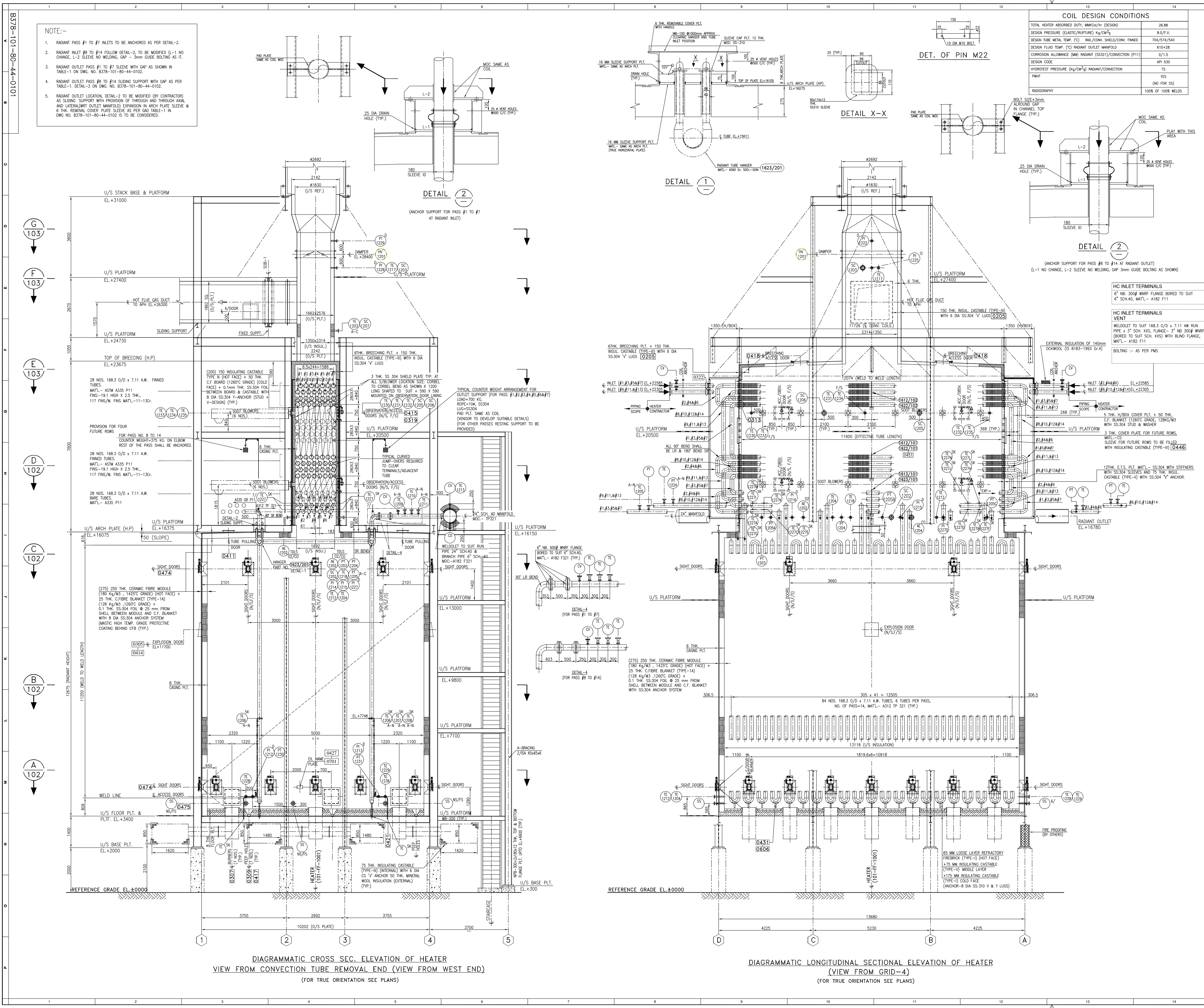
VIEW B
106

REF. DWG. NO.	REFERENCE DRAWING TITLE
B378-101-80-44-0101	GENERAL ARRGT. CROSS SECTION & LONG SECTION
B378-101-80-44-0106	APH SYSTEM DUCTING LAYOUT - PLAN

NOTES :-

REV	DATE	REVISIONS	BY	CHKD	APPO	PEMPO
0	19.05.2022	ISSUED FOR ENGINEERING	MB	AV	RP	
1	27.01.2022	ISSUED FOR ENGINEERING	MB	AV	RP	
2	07.01.2022	ISSUED FOR BOS/COMMENTS	MB	AV	RP	
3	10.09.2021	ISSUED FOR BOS/COMMENTS	MB	AV	RP	

	ENGINEERS INDIA LIMITED (A Govt. of India Undertaking)
	GAIL (INDIA) LIMITED USAR, MAHARASHTRA
500 करोड़ पौडोरच पोरी परोजेजना उचर महाराष्ट्र	500 KTA PDH - PP PROJECT USAR, MAHARASHTRA INDIA
एपिचर प्रगाली इकाटिंग एलिवेशन REACTOR CHARGE HEATER (101-FF-1001)	APH SYSTEM DUCTING LAYOUT ELEVATION REACTOR CHARGE HEATER (101-FF-1001)
SCALE 1:75	JOB NO. B378101
UNIT	DIVN DEPT DWG NO. REV
	804401070



NOTE:-

- RADIANT PASS #1 TO #7 INLETS TO BE ANCHORED AS PER DETAIL-2.
- RADIANT INLET #8 TO #14 FOLLOW DETAIL-2, TO BE MODIFIED (L-1 NO CHANGE, L-2 SLEEVE NO WELDING, CAP - 3mm GUIDE BOLTING AS IT).
- RADIANT OUTLET PASS #1 TO #7 SLEEVE WITH CAP AS SHOWN IN TABLE-1 ON DWG. NO. B378-101-80-44-0102.
- RADIANT OUTLET PASS #8 TO #14 SLIDING SUPPORT WITH CAP AS PER TABLE-1, DETAIL-3 ON DWG. NO. B378-101-80-44-0102.
- RADIANT OUTLET LOCATION, DETAIL-2 TO BE MODIFIED (BY CONTRACTOR) AS SLIDING SUPPORT WITH PROVISION OF THROUGH AND THROUGH AXIAL AND LATERAL/OUTLET MANIFOLD EXPANSION IN ARCH PLATE SLEEVE & 6 THK. REMOVAL COVER PLATE SLEEVE AS PER CAP TABLE-1 IN DWG NO. B378-101-80-44-0102 IS TO BE CONSIDERED.

COIL DESIGN CONDITIONS	
TOTAL HEATER ABSORBED DUTY, MW/CH/HR (DESIGN)	26.88
DESIGN PRESSURE (ELASTIC/RUPURE) Kg/cm^2	8.0/7.4
DESIGN TUBE METAL TEMP. (°C) RAD./CONV. SHIELD/CONV. FINED	704/514/540
DESIGN FLUID TEMP. (°C) RADIANT OUTLET MANIFOLD	610+28
CORROSION ALLOWANCE (MM) RADIANT (SS321)/CONVECTION (P11)	0/1.5
DESIGN CODE	API 530
HYDROTEST PRESSURE (Kg/cm^2) RADIANT/CONVECTION	75
PAINT	YES
	(NO FOR SS)
	100% OF 100% WELDS

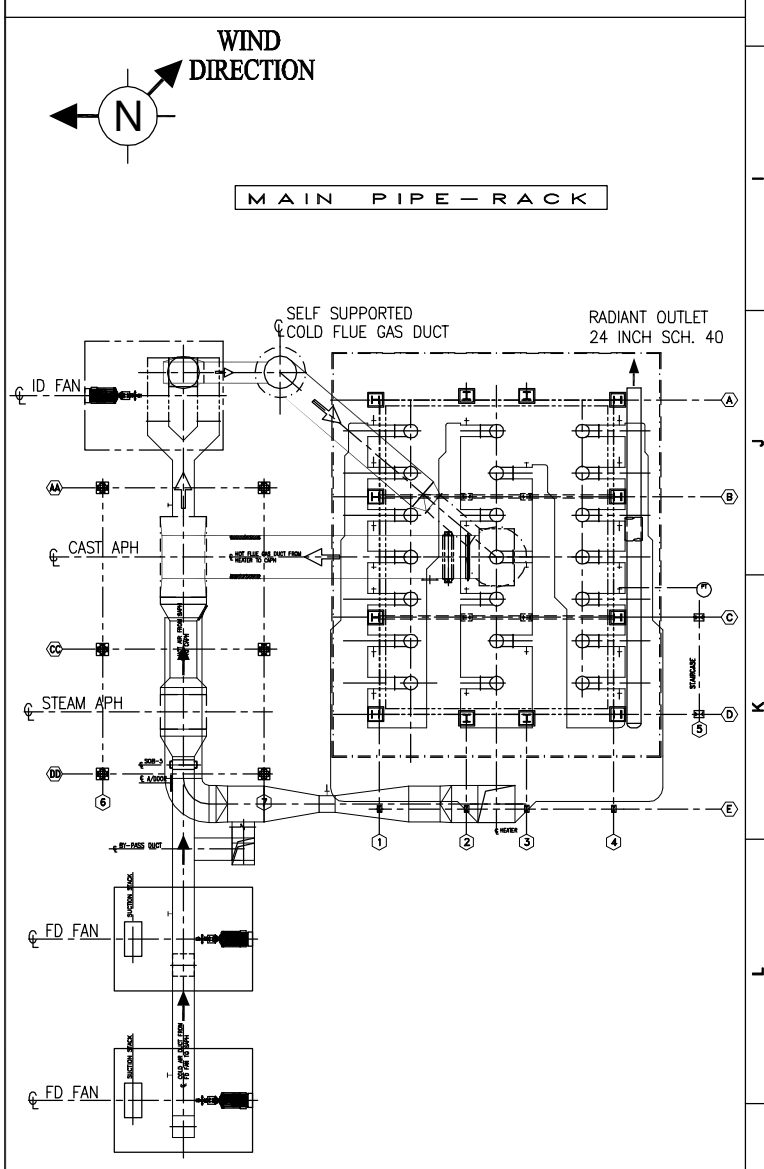
REF. DWG. NO.	REFERENCE DRAWING TITLE
B378-101-16-43-00002	EQUIPMENT LAYOUT FOR PCH UNIT
B378-101-80-44-1100	FOUNDATION LAYOUT PLAN
B378-101-80-44-0102	GENERAL ARRANGEMENT PLAN-1
B378-101-80-44-0103	GENERAL ARRANGEMENT PLAN-2
B378-101-80-44-1104	GENERAL ARRANGEMENT STACK
B378-101-80-44-1105	TUBE SUPPORT CASTINGS
B378-101-80-44-0106	API SYSTEM DUCTING LAYOUT PLAN
B378-101-80-44-0107	API SYSTEM DUCTING LAYOUT ELEVATION
B378-101-80-44-0108	API SYSTEM DUCTING LAYOUT ELEVATION
B378-101-80-44-0109	MAIN MEMBER STRUCTURE CONFIGURATION-ELEVATION
B378-101-80-44-0110	GENERAL NOTES

- NOTES:-
- ALL NOTATIONS:-
 - SECTION PLANS OR DETAILS.
 - CROSS REFERENCE DRG. NO. IF LEFT BLANK, DENOTES DETAIL APPEARS ON SAME DRAWING SHEET.
 - DENOTES PART NO.
 - DENOTES COLUMN GRID NO.
 - DENOTES AUXILIARY CONNECTIONS.
 - DENOTES STANDARD DRAWING NO.
 - DENOTES GRATING MAIN BAR SPAN.
 - SLIDING SUPPORT.
 - FIXED SUPPORT.
 - RESTING SUPPORT.
 - ALL DIMENSIONS ARE IN MM.
 - DO NOT SCALE DRAWING ASK IF IN ANY DOUBT.

SKIN THERMOCOUPLE DETAILS.	
TAG NO.	LOCATION
11227 - A TO N	CONNECTION BOTTOM MOST SHOCK TUBES
11206 - A TO N	5TH TUBE FROM RADIANT OUTLET
11207 - A TO N	3RD TUBE FROM RADIANT OUTLET
11208 - A TO N	AT RADIANT OUTLET

ALL INSTRUMENT TAG NOS SHALL BE PRE FIXED WITH "1".
Eg. TE-1228 SHOULD BE READ AS TE-11228.

HOLDS:- (TO BE REMOVED BY HEATER CONTRACTOR)
- FLOOR CUTOUTS (BURNERS, PEEP HOLES, SKIN THERMOCOUPLE LOCATION, WASTE GAS NOZZLE LOCATION).



REVISIONS			
REV.	DATE	REVISIONS	BY
0	18.05.2022	ISSUED FOR ENGINEERING	MB AV RP
1	27.01.2022	ISSUED FOR ENGINEERING	MB AV RP
2	07.01.2022	ISSUED FOR BIOS/COMMENTS	MB AV RP
3	10.09.2021	ISSUED FOR BIOS/COMMENTS	MB PKA/AV RP
4			
5			
6			
7			
8			
9			
10			
11			
12			
13			
14			
15			
16			

GAIL (India) Limited

ENGINEERS INDIA LIMITED
(A Group of India Undertaking)

गैल इंडिया लिमिटेड
GAIL (INDIA) LIMITED
USAR, MAHARASHTRA

500 कॅलोरी वीहोचर पीपी प्रोजेक्ट
उत्तराखण्ड भारत

500 KTA PCH - PP PROJECT
USAR, MAHARASHTRA, INDIA

सामान्य व्यवस्था अनुभाग और
प्रमुख विचारक चार्ज होवर
(101--FF-1001)

GENERAL ARRG. CROSS SEC. &
LONG. SEC. REACTOR CHARGE
HEATER (101--FF-1001)

SCALE: 1:55

JOB NO. B378101

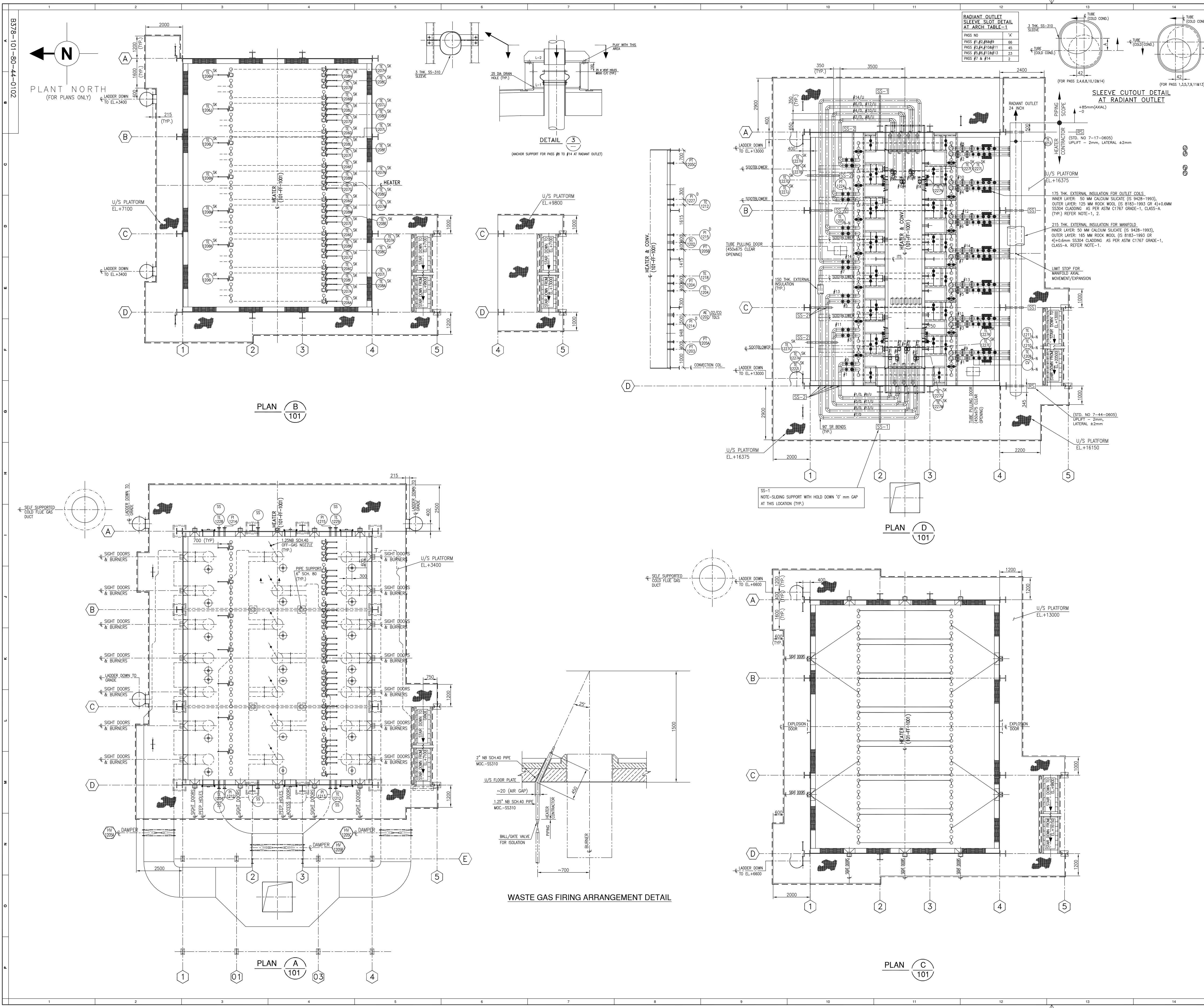
UNIT: 01

DIVN. DEPT. DWG. NO. 804401010

REV. 0

प्रमुख अधिकारी एवं प्रमुख निरीक्षक विभाग निदेशिका को संदर्भित है। ये कार्य उत्तराखण्ड के राज्य सरकार के अधिकार क्षेत्र में हैं।
आम्र (एच. आर.) नं. 1 प्रमाणित है। यह कार्य उत्तराखण्ड के अधिकार क्षेत्र में है।
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प्रस्तुत आरेख एवं सूची निर्धारित विवरणों के अनुसार तैयार की गई हैं। ये आरेख केवल संदर्भ के लिए हैं और इनका उपयोग किसी भी प्रकार के निर्माण कार्य के लिए नहीं किया जाना चाहिए।
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REF. DWG. NO.	REFERENCE DRAWING TITLE
B378-101-80-44-0101	GENERAL ARRANGEMENT CROSS SECTION & LONGITUDINAL SECTION

NOTES :-

- OF BLANKET SHALL BE INHIBITED FOR CHLORIDE LEVEL LESS THAN 10PPM. A 0.15MM THK SS 304 TOL WRAP OVER THE PIPING / MANIFOLD TO AVOID DIRECT CONTACT OF THE INSULATION TO STAINLESS STEEL. SUBMITTIVE.
- THE CONTRACTOR SHALL PROVIDE A METHOD(S) FOR SUPPORTING THE BLANKET INSULATION TO PREVENT EXCESSIVE SAGGING, PARTICULARLY ON VERTICAL LINES.

REV.	DATE	REVISIONS	BY	CHKD	APPD	PERMTC
0	19.05.2022	ISSUED FOR ENGINEERING	MB	AV	RP	
C	27.01.2022	ISSUED FOR ENGINEERING	MB	AV	RP	
B	07.01.2022	ISSUED FOR BIDS/COMMENTS	MB	AV	RP	
A	10.09.2021	ISSUED FOR BIDS/COMMENTS	MB	PK/AV	RP	

ENGINEERS INDIA LIMITED
(A Group of India Undertakings)
गैल इंडिया लिमिटेड
GAIL (INDIA) LIMITED
USAR, MAHARASHTRA

500 केल्विन पोडोचर की परियोजना
उत्तर महाराष्ट्र

500 KTA PDH -- PP PROJECT
USAR, MAHARASHTRA
INDIA

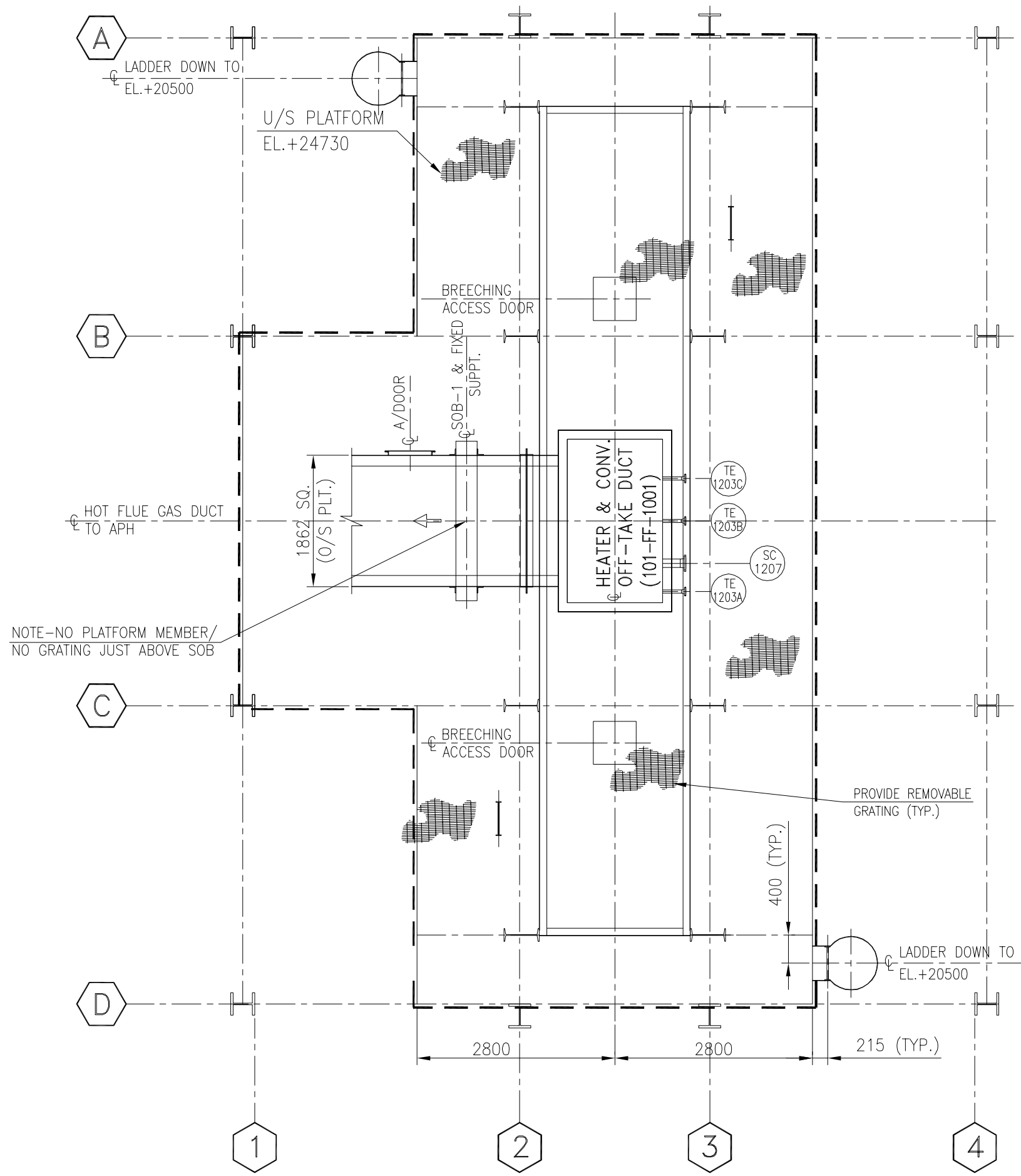
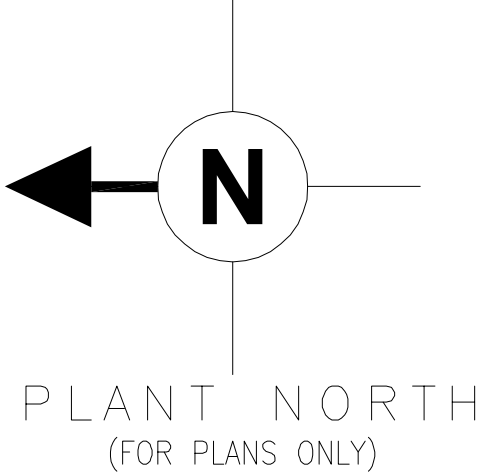
केल्विन पोडोचर की परियोजना
उत्तर महाराष्ट्र

GENERAL ARRGT. PLAN-I
REACTOR CHARGE HEATER
(101-FF-1001)

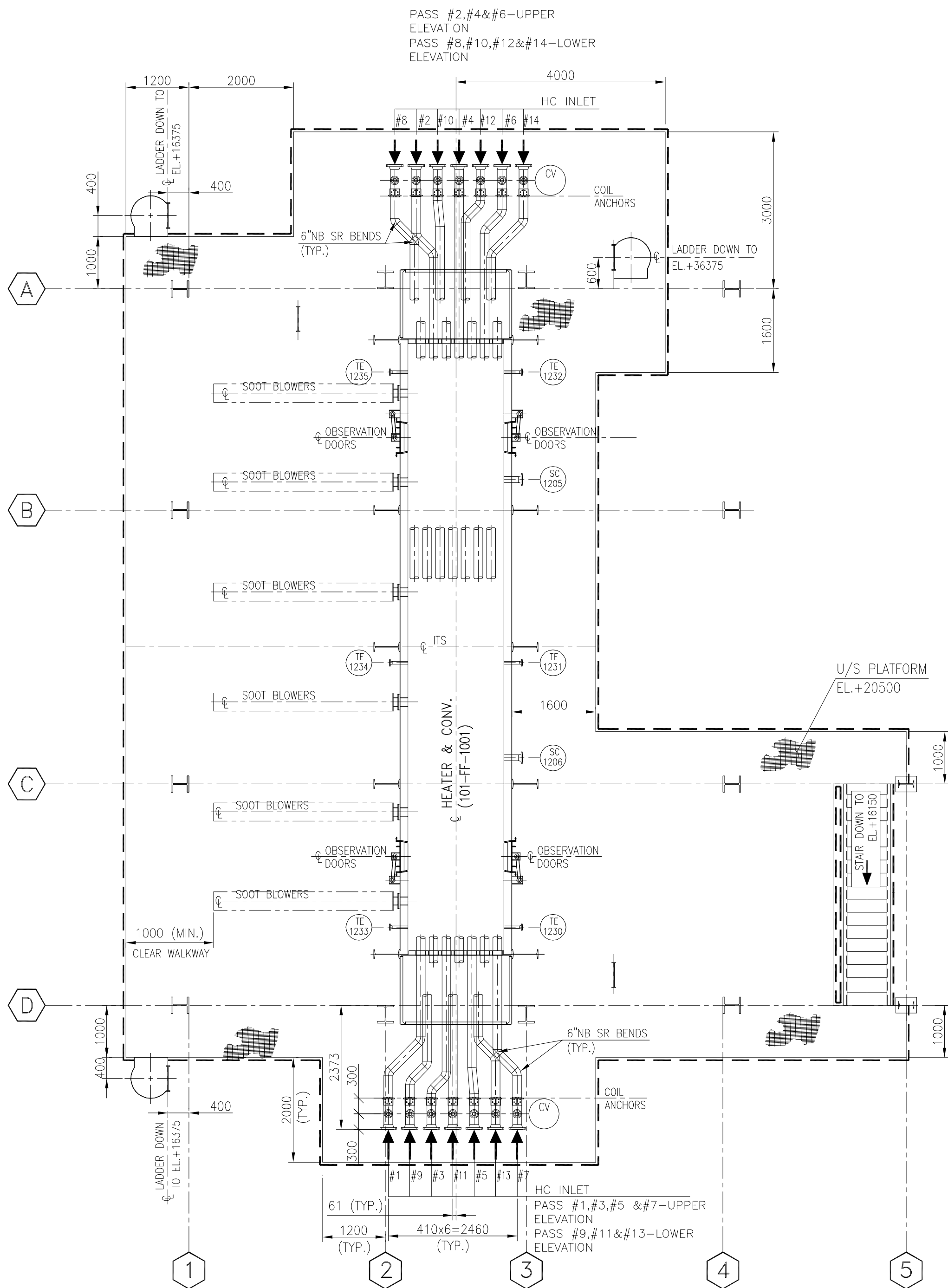
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3-1641-0500 REV.2 A0-1189 x 841

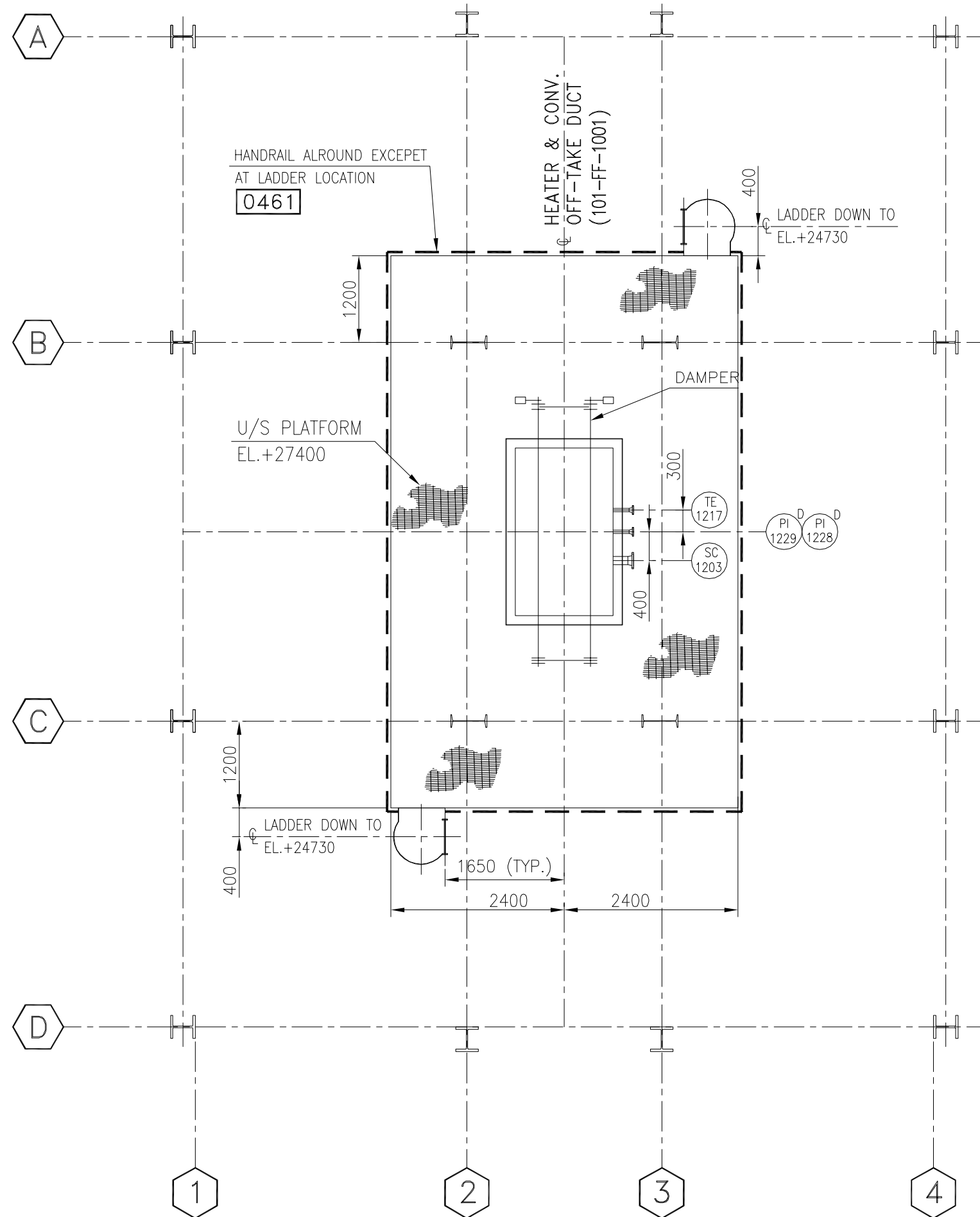
प्रस्तुत आरेख एवं उसके निर्माण विवरण इंजीनियरिंग दस्तावेज के अंग हैं। ये आरेख आमतौर पर एक ही आरेख के अंग हैं और अलग-अलग हो सकते हैं। यदि वे अलग-अलग हो सकते हैं, तो उन्हें अलग-अलग दस्तावेजों में दर्ज किया जाना चाहिए।
आरेख तैयार करने वाले इंजीनियर के अधिकार क्षेत्र के अंतर्गत हैं।
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PLAN F 101



PLAN E 101



PLAN G 101

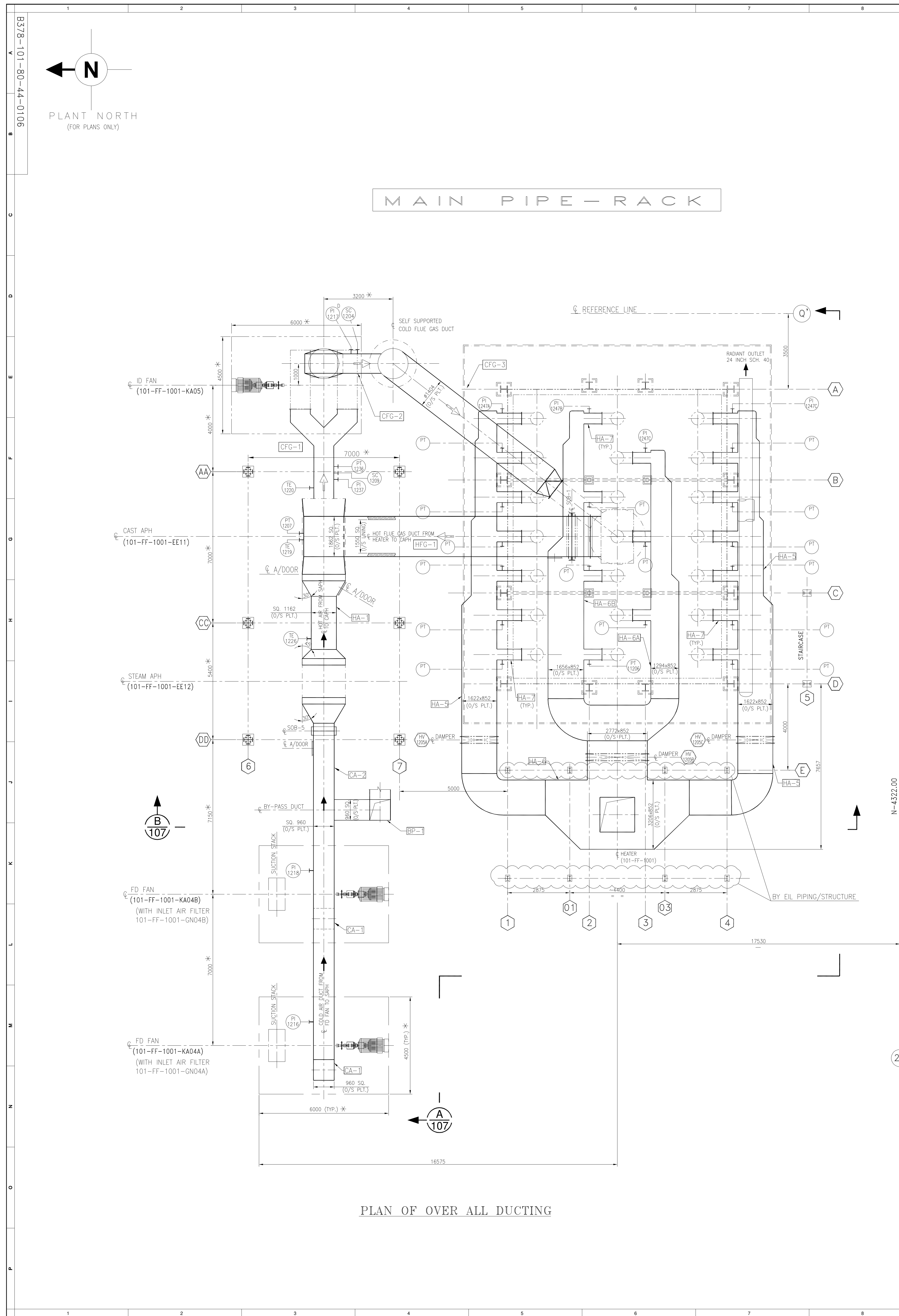
REF. DWG. NO.	REFERENCE DRAWING TITLE
B378-101-80-44-0101	GENERAL ARRANGEMENT CROSS SECTION & LONGITUDINAL SECTION
B378-101-80-44-0102	GENERAL ARRANGEMENT PLAN-I

NOTES :-

REV.	DATE	REVISIONS	BY	CHKD	APPD	REMARKS
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 ENGINEERS INDIA LIMITED (A Govt. of India Undertaking)	
 GAIL (INDIA) LIMITED USAR, MAHARASHTRA	
500 कैंटीन पीडोपच पीवी परियोजना उत्तर महाराष्ट्र भारत	500 KTA PDH - PP PROJECT USAR, MAHARASHTRA INDIA
कैंटीन पीडोपच पीवी परियोजना उत्तर महाराष्ट्र	GENERAL ARRANGEMENT PLAN-II
SCALE JOB NO. UNIT DIVN DEPT DWG. NO. REV.	1:56.6 B 3 7 8 1 0 1 8 0 4 4 0 1 0 3 0

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LIST OF DAMPERS / SHUT-OFF BLADES FOR REACTOR CHARGE HEATER & APH SYSTEM (101-FF-1001)				
S.NO.	TAG NO.	LOCATION	DUCT ORIENTATION	REMARKS
1.	HV-1201	BELOW STACK BASE	VERTICAL	PNEUMATIC OPERATED/ MANUAL OPERATION
2.	HV-1202	CA-1	INCLINED	MANUAL SELF OPENING/CLOSING
3.	HV-1203	CA-1	INCLINED	" "
4.	HV-1204	BP-1	VERTICAL	PNEUMATIC OPERATED/ MANUAL OPERATION
5.	HV-1205 HV-1206 HV-1207	HA-4	VERTICAL	PNEUMATIC OPERATED/ MANUAL OPERATION
6.	SOB-1	HFG-1	HORIZONTAL	MANUAL OPERATION
7.	SOB-2	CFG-3	HORIZONTAL	MANUAL OPERATION
8.	SOB-3	CA-1	INCLINED	MANUAL OPERATION
9.	SOB-4	CA-1	INCLINED	MANUAL OPERATION
10.	SOB-5	CA-2	HORIZONTAL	MANUAL OPERATION
11.	SOB-6	HA-2	HORIZONTAL	MANUAL OPERATION

DUCT DETAILS FOR REACTOR CHARGE HEATER & APH SYSTEM (101-FF-1001)										
DUCT MARK	SERVICE	DUCT FLOW AREA (M ²)	DUCT SIZE (O/S PLT.)	INSULATION		TIE BACK			CASING MIN TEMP °C	REMARKS
				TYPE	THK.	TYPE	MATL.	SPEC./ DWG.		
CA-1	COLD AIR FROM FD PAN DISC. TO DUCT CA-2	0.9	960 SQ.	—	—	—	—	—	360	
CA-2	COLD AIR FROM CA-2 TO STEAM APH	0.9	960 SQ.	—	—	—	—	—	360	
BP-1	TOTAL AIR BYPASS (SAPH+CAPH)	0.9	960 SQ.	50mm MINERAL WOOL		WIRE MESH + CLADDING				
BP-2	TOTAL AIR BYPASS (SAPH+CAPH)	0.9	1112 SQ.	⊙ ⊙		WIRE MESH + CLADDING	GH+AL	REFER TENDER	360	
HA-1	HOT AIR FROM STEAM APH TO CAPH	1.0	1162 SQ.	⊙ ⊙			GH+AL	??	360	
HA-2	HOT AIR FROM CAPH TO HEATER	2.1	1612 SQ.	⊙ ⊙				??	360	
HA-3	FLOW ELEMENT DUCT (VERTICAL)	1.49	1592	⊙ ⊙				??	360	
HA-4	HOT AIR DISTRIBUTION HEADER	2.1	1612 SQ. 32064852	⊙ ⊙			??	??	360	
HA-5	HOT AIR DISTRIBUTION DUCT TO SIDE BURNERS		16224852 AS PER DWG.	⊙ ⊙			??	??	360	
HA-6A	HOT AIR DISTRIBUTION DUCT TO MIDDLE BURNERS	0.78	12944852 AS PER DWG.	⊙ ⊙			??	??	360	
HA-6B	HOT AIR DISTRIBUTION DUCT TO MIDDLE BURNERS	1.03	16564852 AS PER DWG.	⊙ ⊙			??	??	360	
HA-7	INDIVIDUAL DUCT TO BURNER	*	AS PER BURNER DWG.	⊙			??	??	360	
HFG-1	HOT FLUE GAS DUCT FROM HEATER TO CAST APH	2.4	1822 SQ.	⊙	150	6 IN. Y. LUGS (OPTIONAL)	CS & AL	SS304		#
CFG-1	COLD FLUE GAS DUCT FROM CAST APH TO ID FAN	1.3	920x1732	⊙		6 IN. Y. LUGS & WIRE MESH + CLADDING	CS & AL	7-17-205		#
CFG-2	COLD FLUE GAS DUCT FROM ID FAN TO GRADE MOUNTED CFG DUCT	1.3	1400 Φ	⊙						#
CFG-3	COLD FLUE GAS DUCT FROM GRADE MOUNTED CFG DUCT TO STACK	1.3	1400 Φ 1262 Φ	⊙						

B376-101-80-44-0101		GENERAL ARRANGEMENT CROSS SEC & LONG SECTION	
B378-101-80-44-0107		APH SYSTEM DUCTING LAYOUT - ELEVATION	
B378-101-80-45-111121		PIPING AND INSTRUMENTATION DIAGRAM FOR AIR PREHEATING SYSTEM OF REACTOR CHARGE HEATER	
NOTES :- 1. 1. TYPICAL NOTATION DENOTES COLUMN FOUNDATION DENOTES AIR FLOW DIRECTION DENOTES FLUE GAS FLOW DIRECTION DENOTES DUCT DESCRIPTION DENOTES DAMPER TAG NO. DENOTES COLUMN GRID LINE DENOTES AUXILIARY CONNECTION (ALL INSTRUMENT TAG NOS) DENOTES PIPING GRID LINE FS-- DENOTES FIXED BOLTED SUPPORT SS-- DENOTES SLIDING SUPPORT GS-- DENOTES DUCT GUIDE SUPPORT RS-- DENOTES RESTING SUPPORT RW-- DENOTES WATER WASHING DIMENSIONS MARKED * TO BE FINALIZED BY CONTRACTOR - CONTRACTOR TO ENSURE COMPLIANCE TO THE P&IDs. - APH SYSTEM ENGINEERING IS TO BE FINALIZED BY HEATER CONTRACTOR AFTER AVAILABILITY OF APH SYSTEM DETAILS AT THEIR END. - ENGINEERING & PROCUREMENT (EQUIPMENT SIZES) SHALL BE DONE TAKING INTO ACCOUNT THE SPACE CONSTRAINTS & FOUNDATION CLEARANCE REQUIREMENT. - THE DIMENSION LIMITS & LOCATION OF FIXED/RESTING/SLIDING SUPPORTS SHALL BE FINALIZED BY HEATER CONTRACTOR. - ALL INSTRUMENTS TAG NO. SHALL BE PR-FIXED WITH-1.			

REV	DATE	REVISIONS	BY
0	19.05.2022	ISSUED FOR ENGINEERING	MB AV RP
C	07.01.2022	ISSUED FOR ENGINEERING	MB AV RP
B	07.01.2022	ISSUED FOR BOS/COMMENTS	MB AV RP
A	10.09.2021	ISSUED FOR BOS/COMMENTS	MB AV RP
		BY (CHKD) APPD PEMPIC	

GAIL (India) Limited

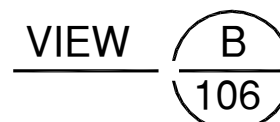
गैल इंडिया लिमिटेड
ENGINEERS INDIA LIMITED
(A Group of India Undertaking)

500 कैंडलर पीपीएच पीपी परीमेजन्डा उत्तर महाराष्ट्र	500 KTA PDH - PP /PROJECT USAR, MAHARASHTRA INDIA
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एपिच प्रणालीवकटिंग लेआउट योजना
REACTOR CHARGE HEATER
(101-FF-1001)

APH SYSTEM DUCTING
LAYOUT PLAN
REACTOR CHARGE HEATER
(101-FF-1001)

SCALE	JOB NO.	UNIT	DIVN	DEPT	DWG NO.	REV.
1:75	B 3 7 8	1 0 1	8 0	4 4	0 1 1 0 6	0
15		16				

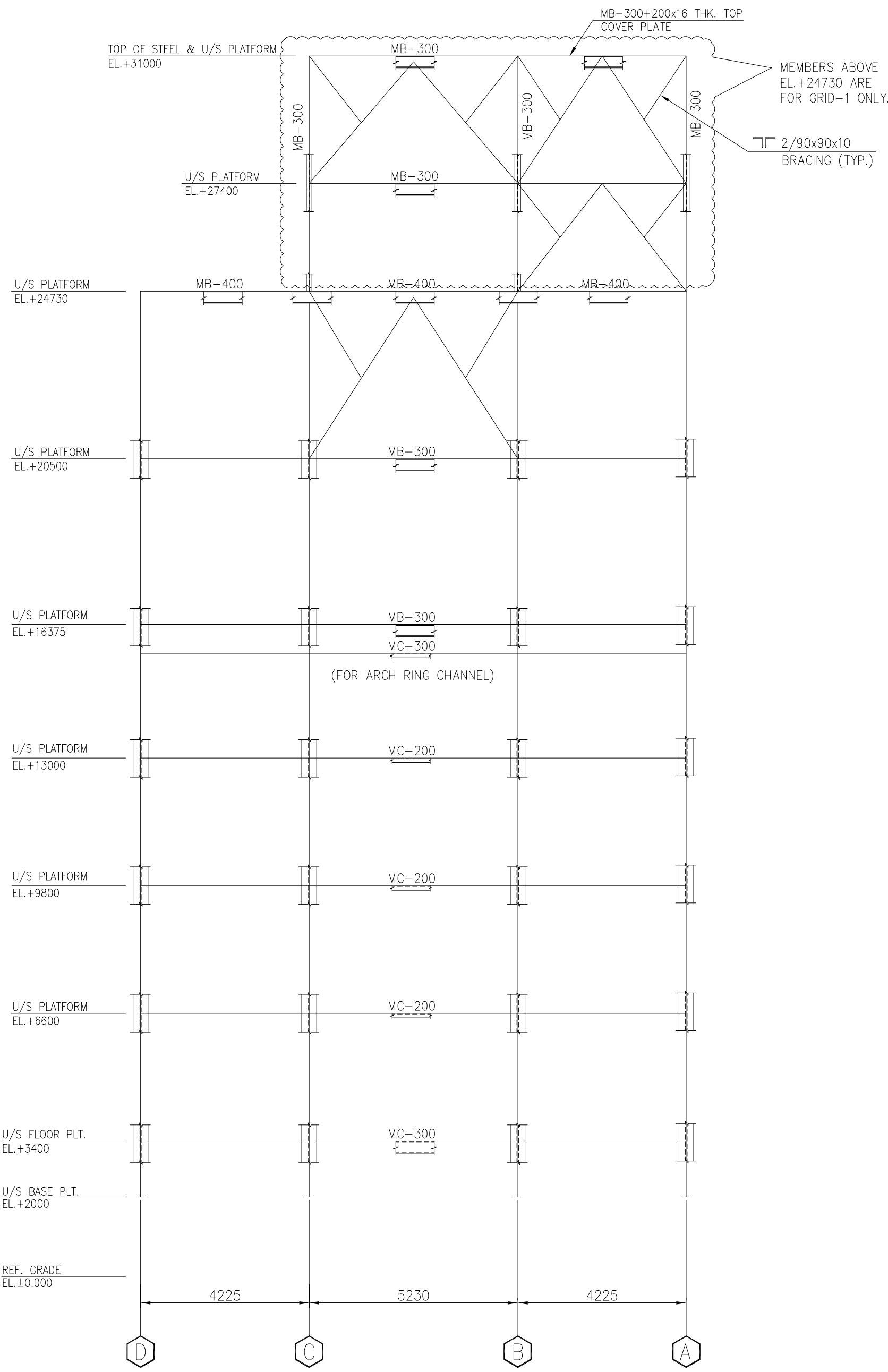
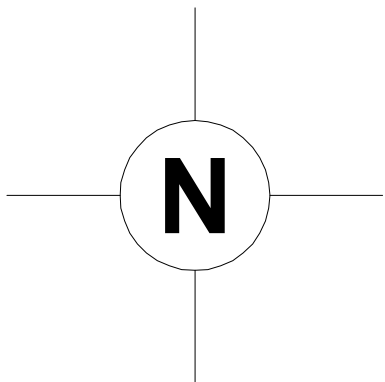


 इंजीनियर्स इंडिया लिमिटेड (A Govt. of India Undertaking)			 ENGINEERS' INDIA LIMITED (A Govt. of India Undertaking)		
 GAIL (India) Limited			गैल इंडिया लिमिटेड GAIL (INDIA) LIMITED USAR, MAHARASHTRA		
500 कैंडेल पीडीएस वॉली पीपीजेयशन REACTOR CHARGE HEATER			500 KTA PDH – PP PROJECT USAR, MAHARASHTRA INDIA		
एपिसच प्रणाली ड्रकटिंग एलिवेशन REACTOR CHARGE HEATER (101FF-1001)			APH SYSTEM DUCTING LAYOUT ELEVATION REACTOR CHARGE HEATER (101FF-1001)		
REACTOR 1:75	JOB NO. B 3	UNIT 7 8 1 0 1	DIVN. DEPT. 8 0 4	WNG. NO. 1 0 1 7	REV. 0

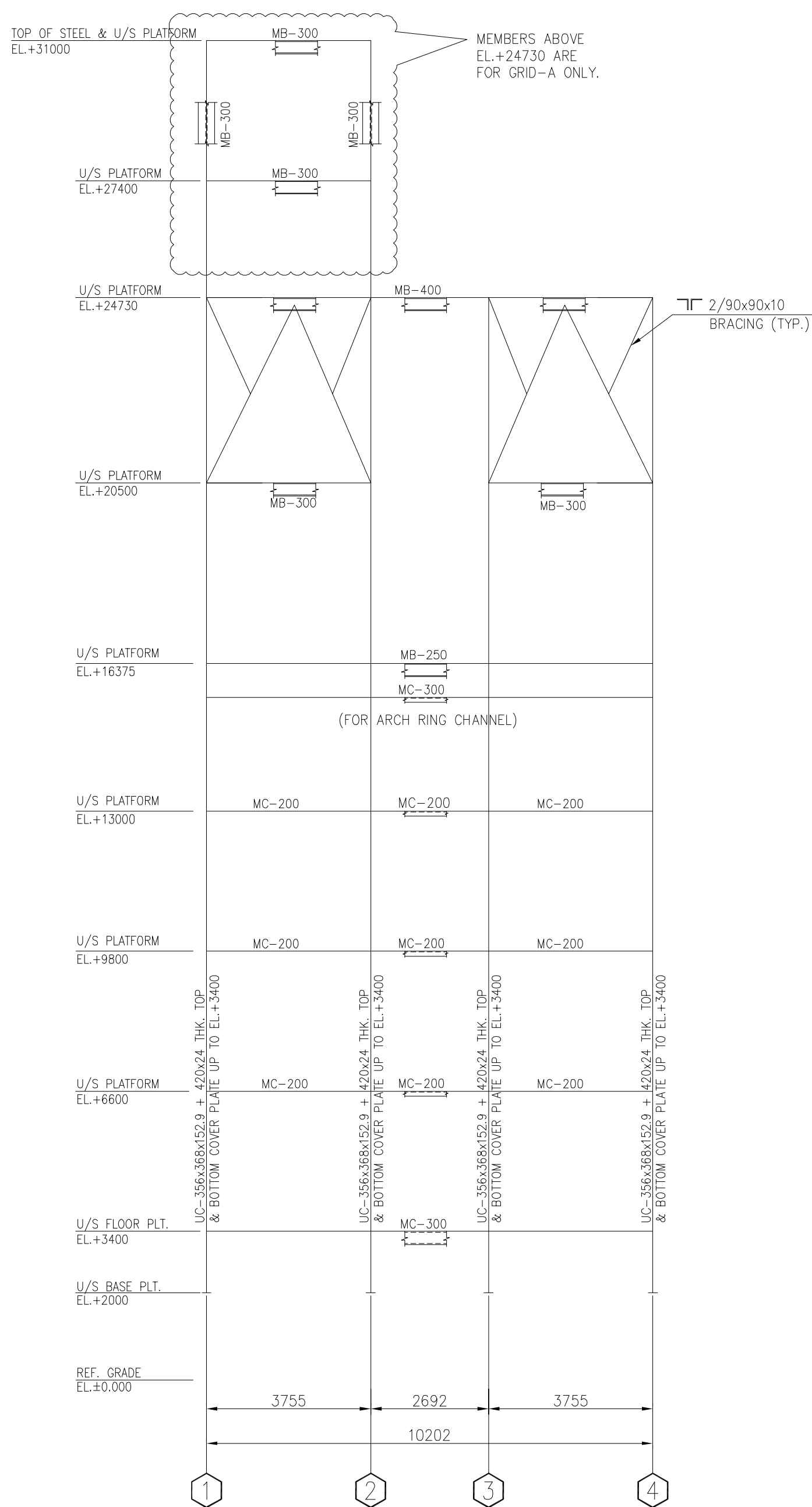
यह दस्तावेज़ गैल इंडिया लिमिटेड के अधिकार में है। इसका उपयोग केवल उद्देश्य के लिए किया जाना है। इस दस्तावेज़ में कोई भी त्रुटि या त्रुटिपूर्ण जानकारी हो सकती है। गैल इंडिया लिमिटेड इस दस्तावेज़ की सटीकता और पूर्णता के लिए कोई भी ज़िम्मेदारी नहीं लेती है।

यह दस्तावेज़ गैल इंडिया लिमिटेड के अधिकार में है। इसका उपयोग केवल उद्देश्य के लिए किया जाना है। इस दस्तावेज़ में कोई भी त्रुटि या त्रुटिपूर्ण जानकारी हो सकती है। गैल इंडिया लिमिटेड इस दस्तावेज़ की सटीकता और पूर्णता के लिए कोई भी ज़िम्मेदारी नहीं लेती है।

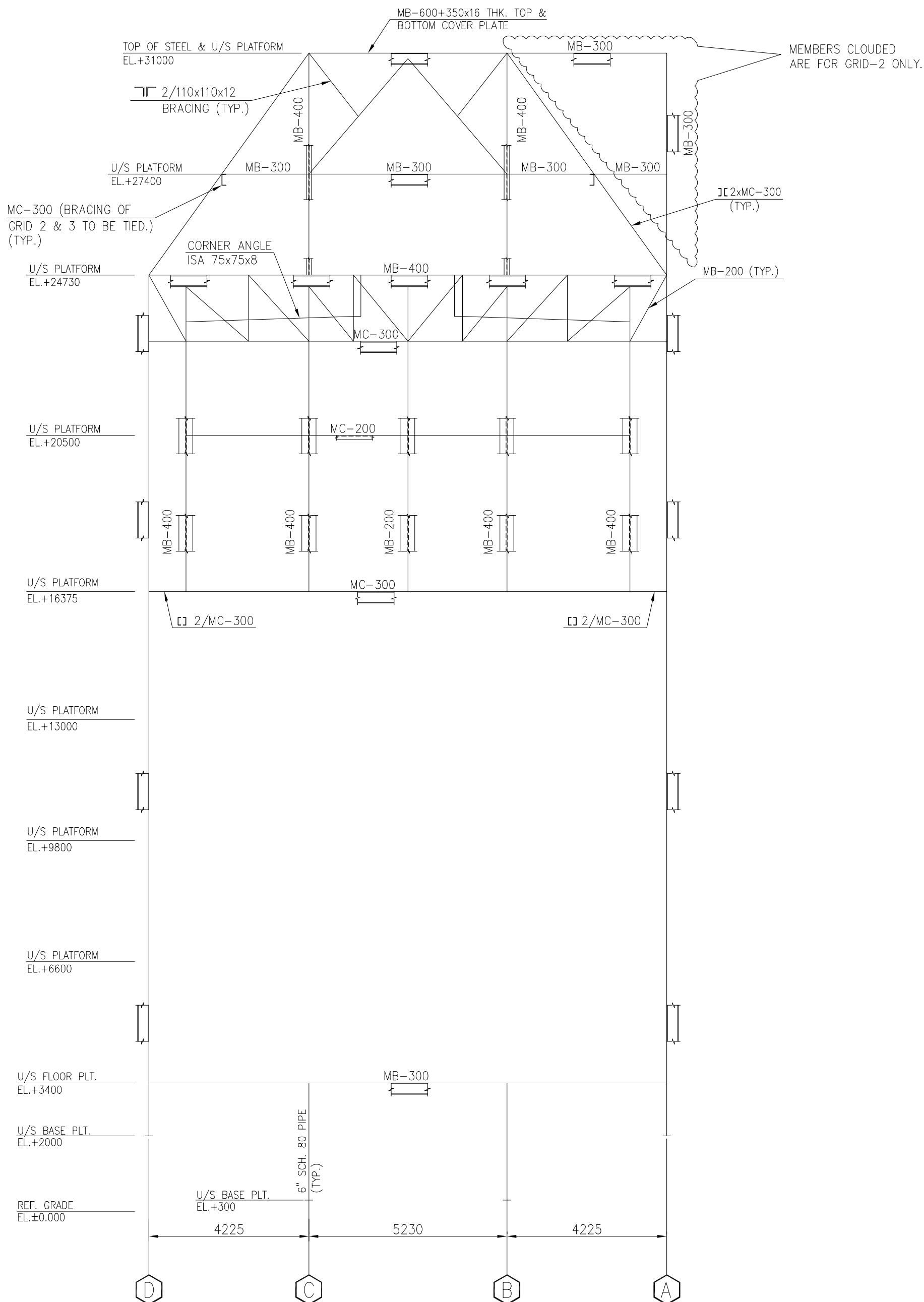
8378-101-80-44-0108



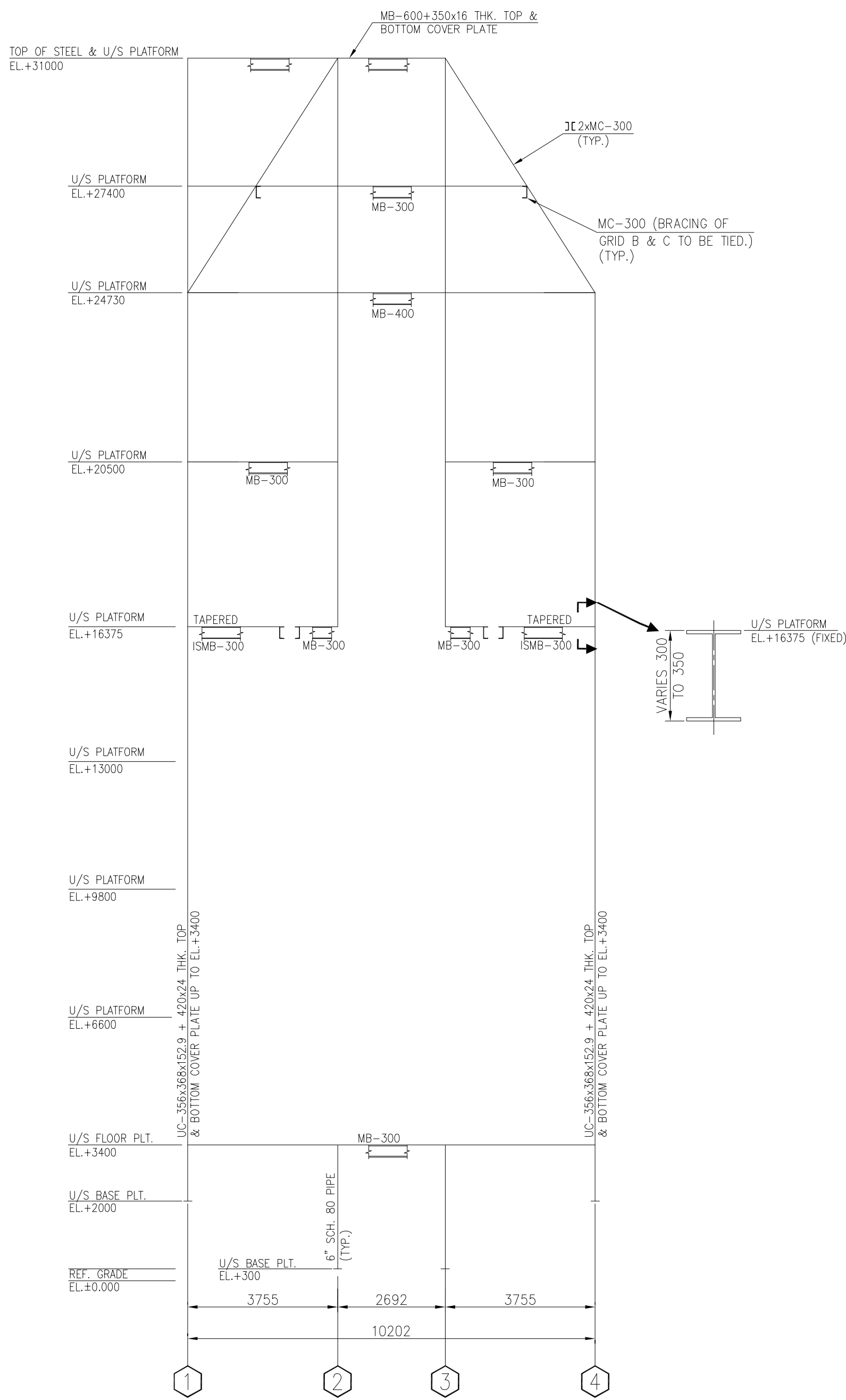
MAIN MEMBER STEEL FRAME WORK
VIEW ON GRID-1 & 4



MAIN MEMBER STEEL FRAME WORK VIEW
ON GRID-A & D



MAIN MEMBER STEEL FRAME WORK
VIEW ON GRID-2 & 3



MAIN MEMBER STEEL FRAME WORK VIEW
ON GRID-B & C

REF. DWG. NO. REFERENCE DRAWING TITLE

8378-101-80-44-0101 GENERAL ARRANGEMENT CROSS SECTION
8378-101-80-44-0109 STRUCTURAL CONFIGURATION - PLANS

NOTES :-

1. ALL DIMENSIONS ARE IN MM.
2. DRAWING TO BE READ IN CONJUNCTION WITH THE HEATER GA DRAWINGS.
3. ADDITIONAL MEMBERS WHEREVER REQUIRED FOR PLATFORM SUPPORTS, PIPING SUPPORT, DUCT SUPPORT, REDUCING PANEL SIZES ETC. SHALL BE ENGINEERED & PROVIDED BY CONTRACTOR.
4. ALL CONNECTIONS AND DETAILS NOT SPECIFICALLY DETAILED SHALL BE SIMILAR TO TYPICAL DETAILS USED FOR SIMILAR CONNECTIONS AND SHALL BE DEVELOPED BY FABRICATOR AND GOT APPROVED FROM EIL.
5. PLAN HORIZONTAL BRACING TO BE LOWERED TO CLEAR DRIVING SUPPORT MEMBERS MATCH C.C. OF BRACING TO CENTRE LINE OF CONNECTING BEAMS WHEREVER FEASIBLE.
6. WHEREVER IN THE BRACING ARRANGEMENT DOUBLE BACK TO BACK ANGLE HAVE BEEN PROVIDED, THE SPACING BETWEEN THE TWO ANGLES SHALL BE AS A MINIMUM EQUAL TO THE THICKNESS OF ANGLE WITH LONG SIDE OF THE ANGLE TO BE TAKEN AS BACK TO BACK.
7. MEMBER ORIENTATION SHALL BE AS PER THE GENERAL ARRANGEMENT DRAWING / STANDARD ORIENTATION FOR THESE TYPE OF HEATER. HEATER VENDOR TO DISCUSS IN CASE OF ANY DOUBT.
8. SECONDARY MEMBERS FOR PLATFORM, DUCT SUPPORTS ETC SHALL BE DESIGNED & WORKED OUT BY CONTRACTOR.
9. ALL JOINTS AND STIFFENERS SHALL BE DESIGNED AND DETAILED BY THE CONTRACTOR.

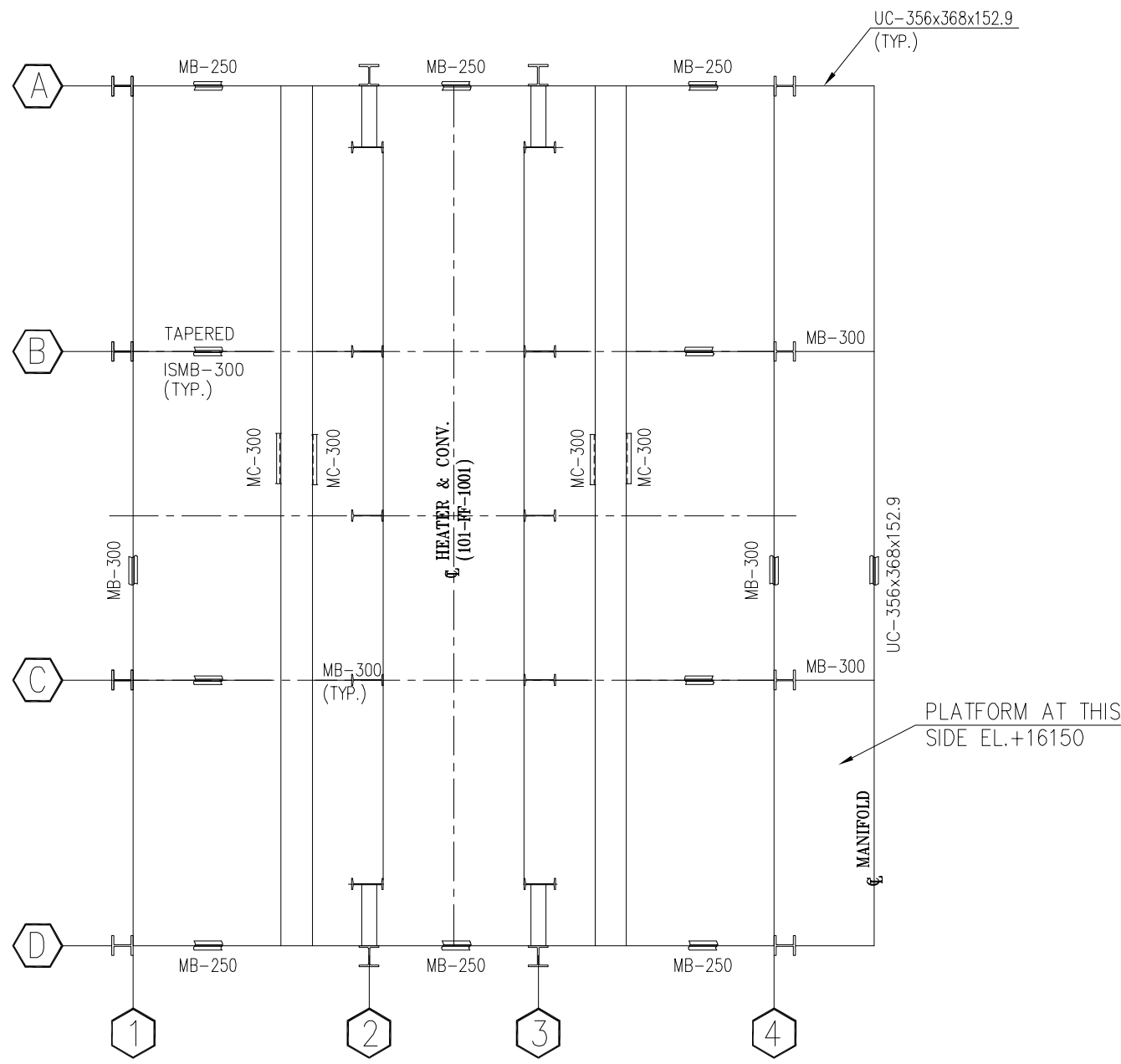
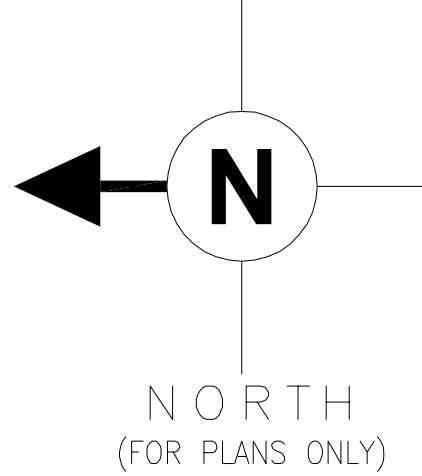
REV.	DATE	REVISIONS	BY	CHKD	APPO	PERMR
0	19.05.2022	ISSUED FOR ENGINEERING	MB	AV	RP	
1	27.01.2022	ISSUED FOR ENGINEERING	MB	AV	RP	
2	07.01.2022	ISSUED FOR BOS/COMMENTS	MB	AV	RP	
3	10.09.2021	ISSUED FOR BOS/COMMENTS	MB	PK/AV	RP	

इंजीनियर्स इंडिया लिमिटेड ENGINEERS INDIA LIMITED (A SECT. OF INDIA UNDER TAKING)	गैल इंडिया लिमिटेड GAIL (INDIA) LIMITED USAR, MAHARASHTRA
500 केल्विन रीफ़रेंस चार्ज हेटर उत्तर - महाराष्ट्र	500 KTA PDH - PP PROJECT USAR, MAHARASHTRA INDIA
संरचनात्मक विचार - उन्नयन REACTOR CHARGE HEATER (101-FF-1001)	STRUCTURAL CONFIGURATION - ELEVATIONS REACTOR CHARGE HEATER (101-FF-1001)
SCALE 1:100	JOB NO. B 3 7 8 1 0 1
UNIT 0	DIVN DEPT. DWG. NO. REV. 8 0 4 4 0 1 0 8 0

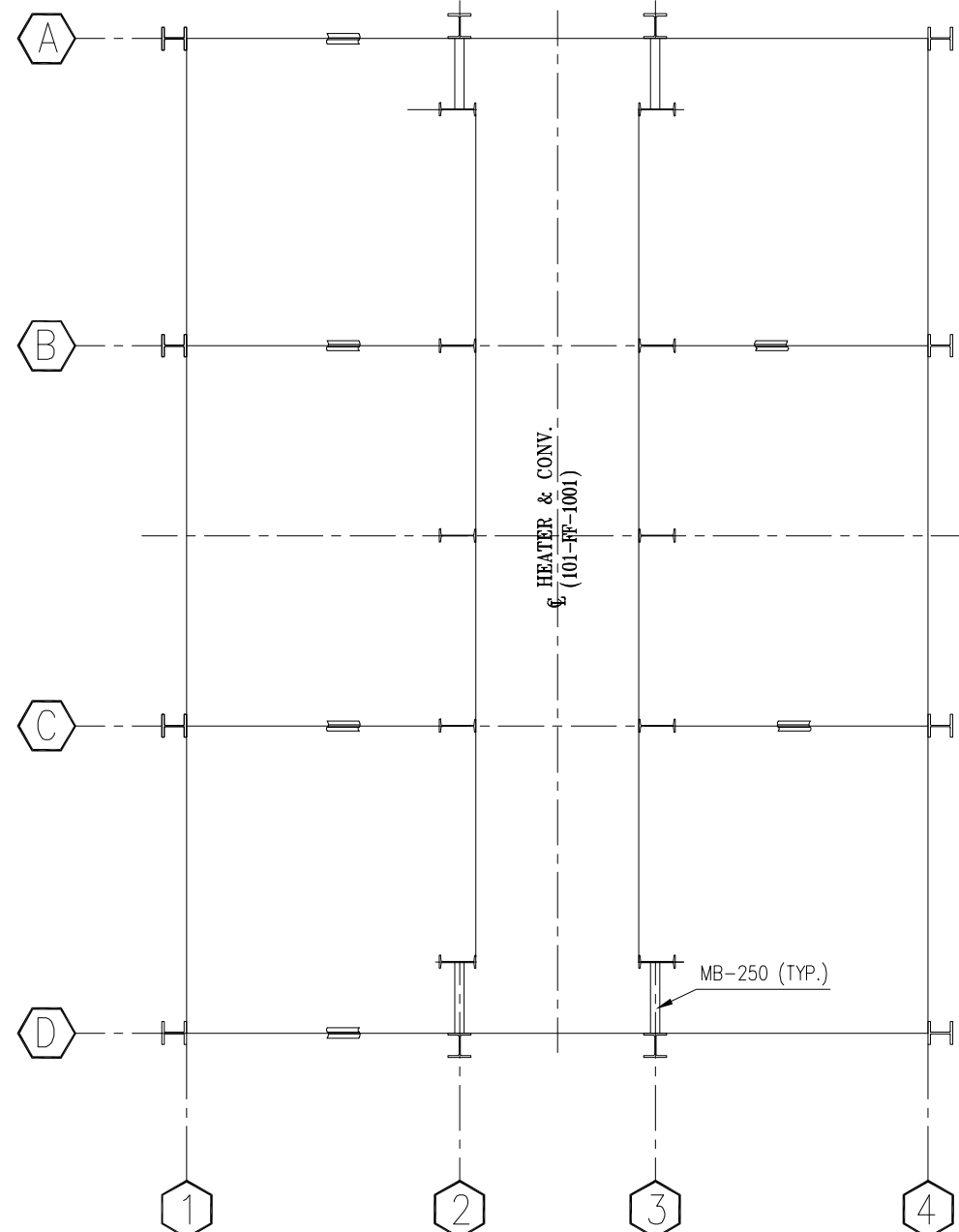
प्रमाणित किया गया है कि यह दस्तावेज़ ग्राहक के द्वारा प्रदान की गई जानकारी के आधार पर तैयार किया गया है। ग्राहक को इस दस्तावेज़ के उपयोग के लिए आवश्यक सभी जानकारी प्रदान की गई है। ग्राहक को इस दस्तावेज़ के उपयोग के लिए आवश्यक सभी जानकारी प्रदान की गई है।

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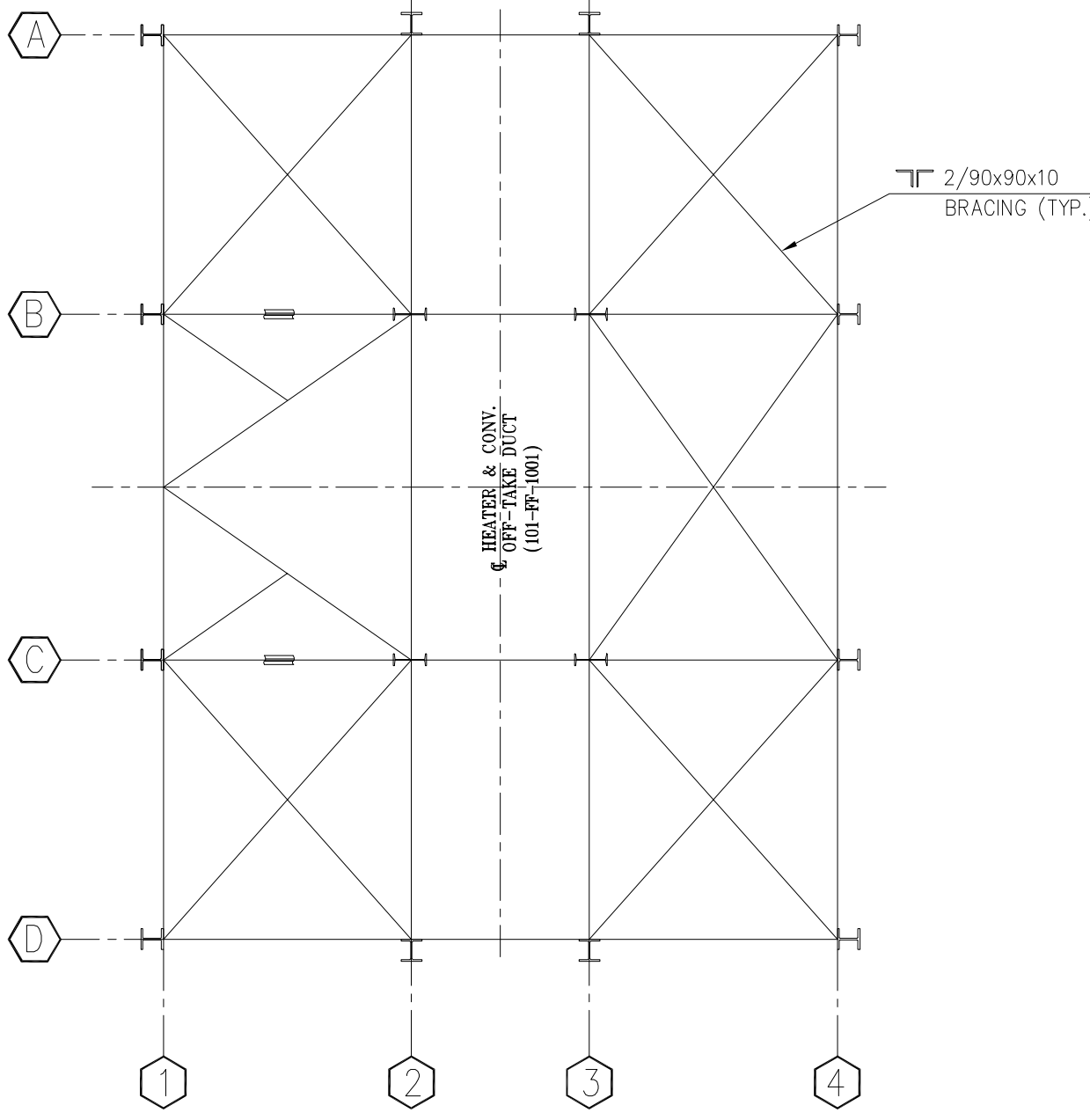
B378-101-80-44-0109



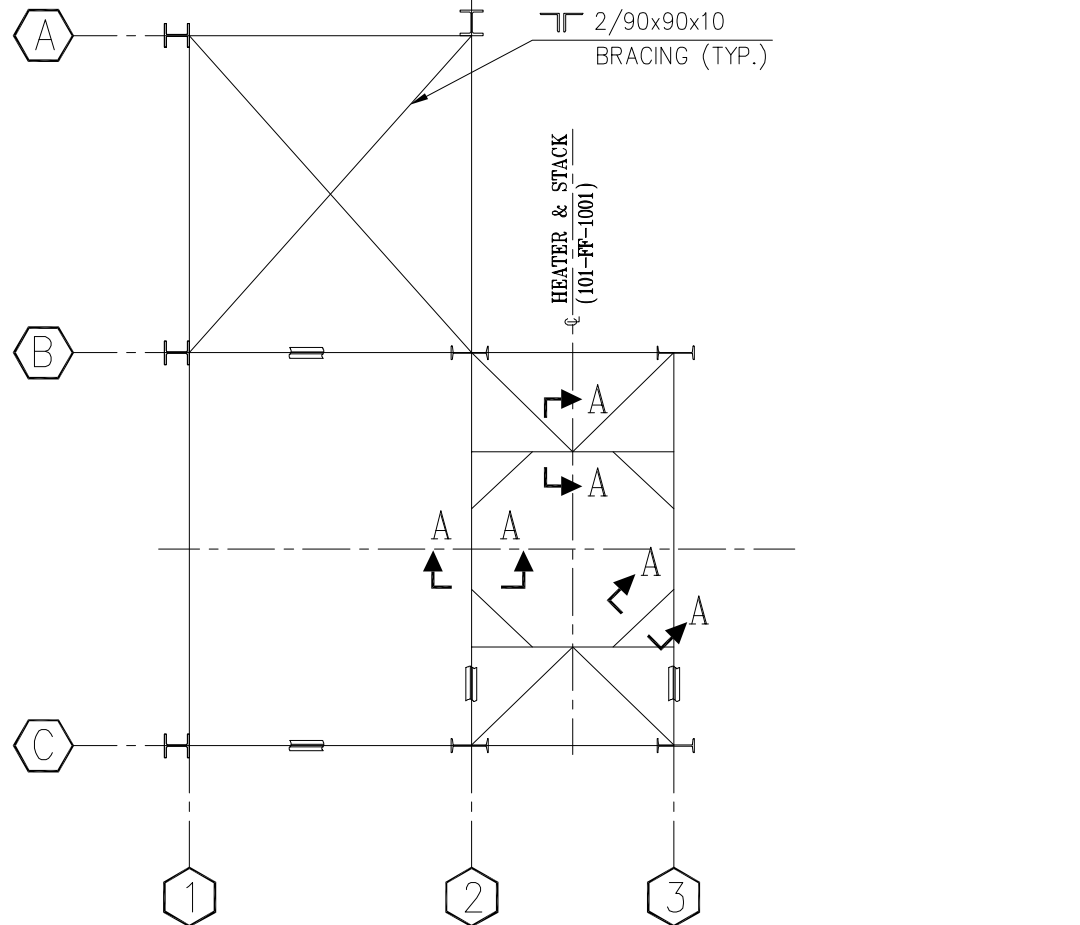
PLAN AT EL+16375



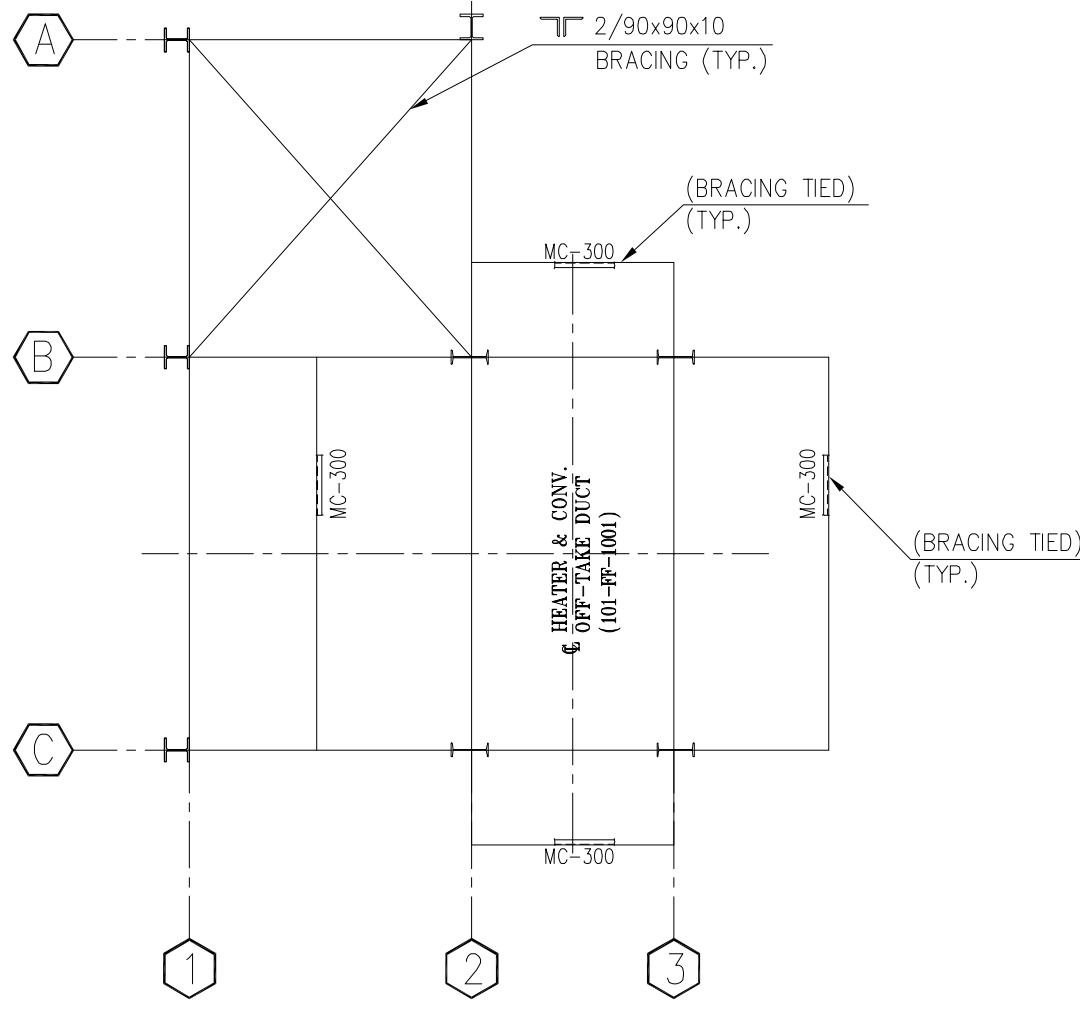
PLAN AT EL+20500



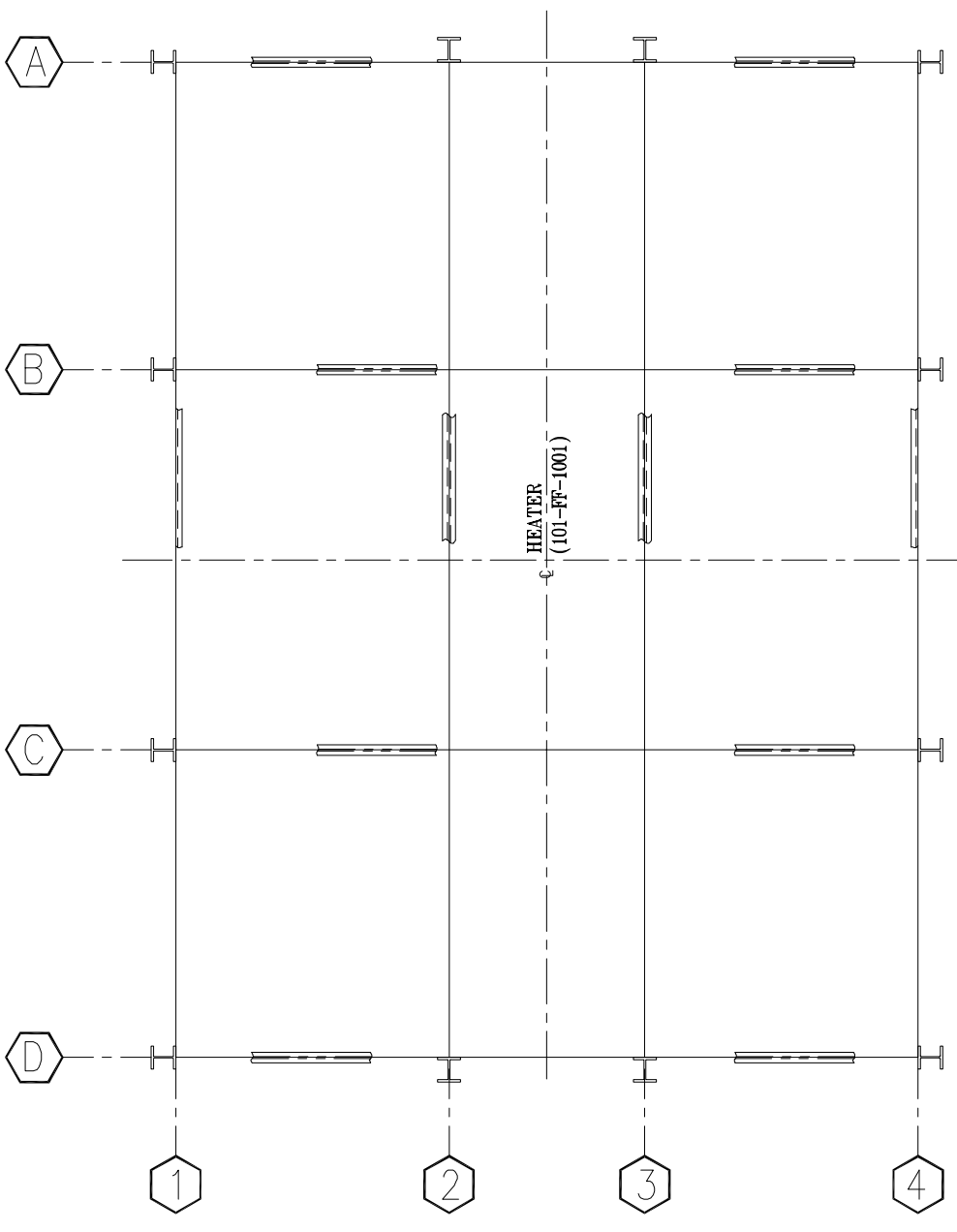
PLAN AT EL+24730



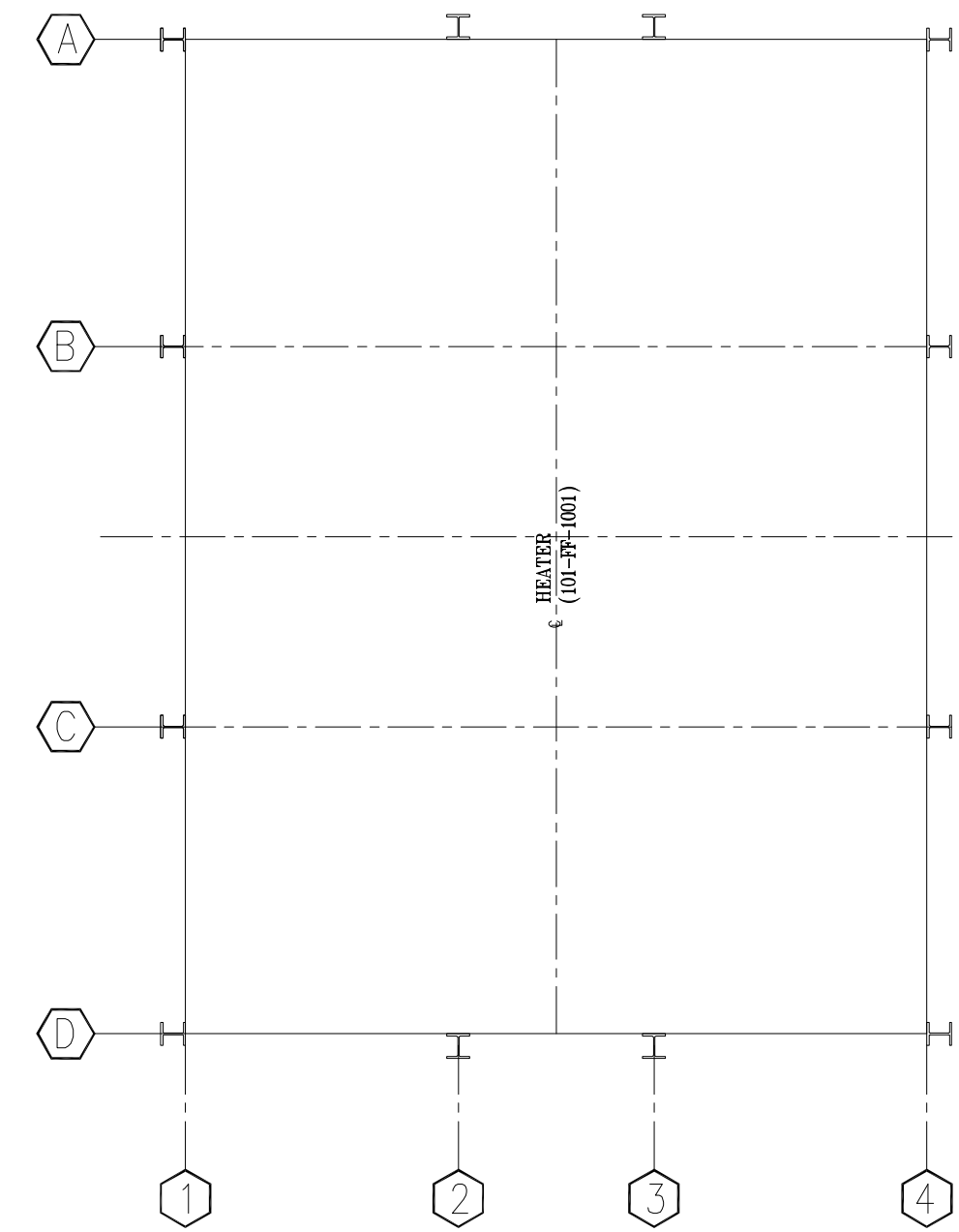
PLAN AT EL+31000



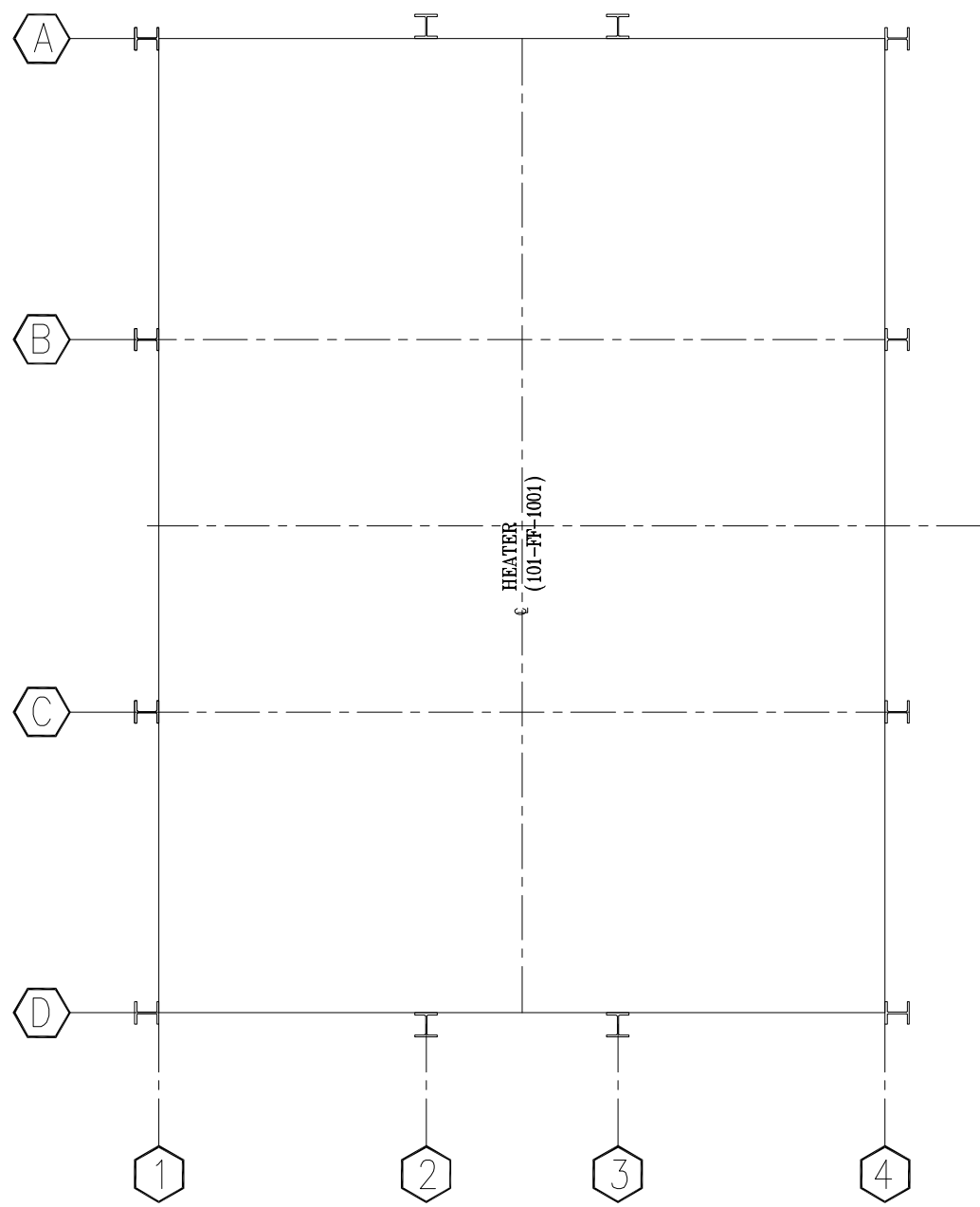
PLAN AT EL+27400



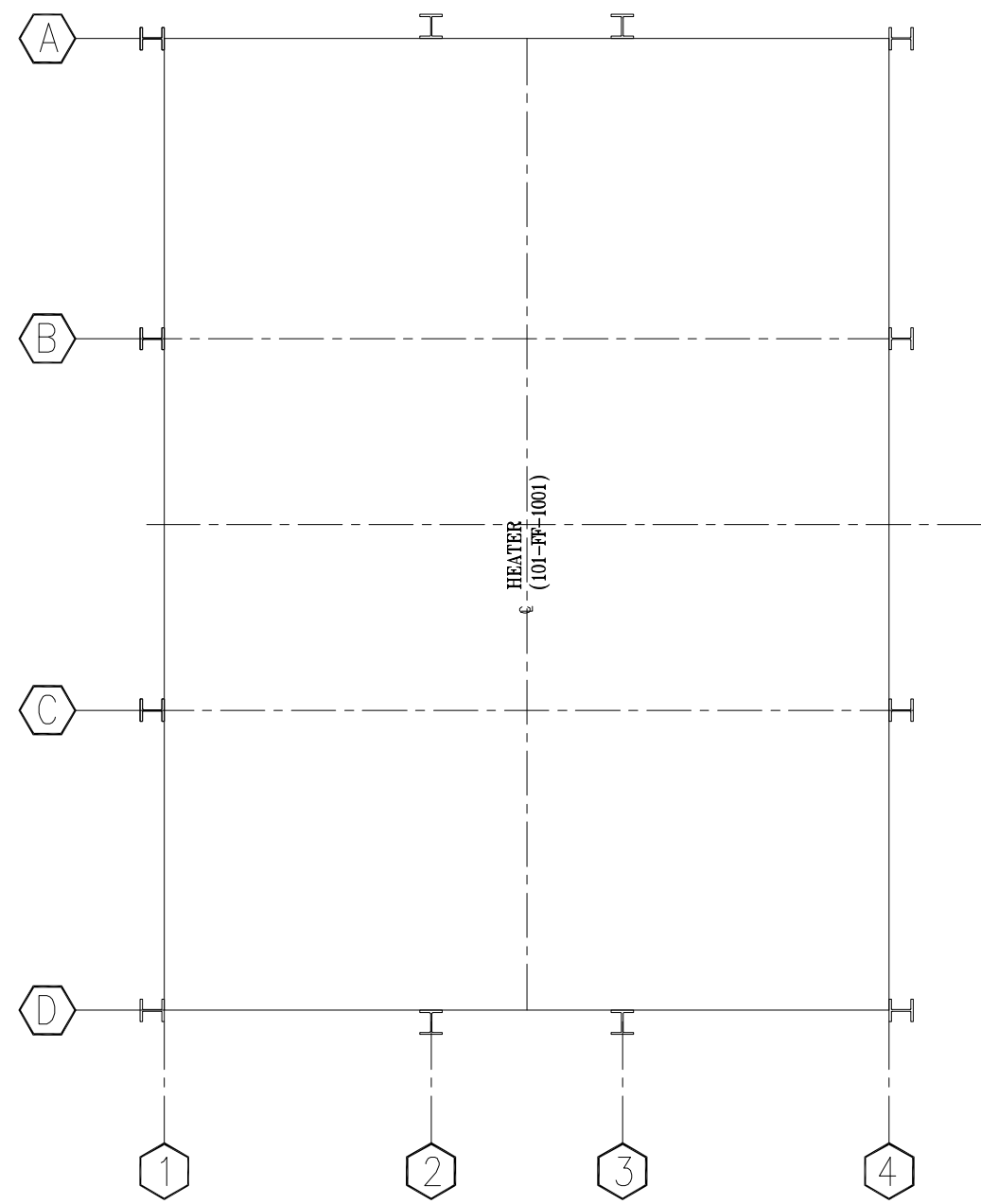
PLAN AT EL+3400



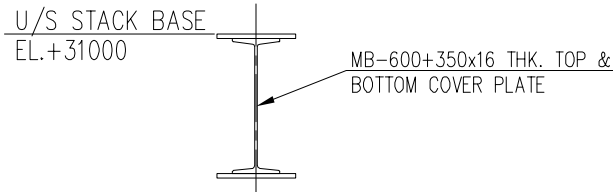
PLAN AT EL+6600



PLAN AT EL+9800



PLAN AT EL+13000



SECTION A-A

REF. DWG. NO.	REFERENCE DRAWING TITLE
B378-101-80-44-0101	GENERAL ARRANGEMENT PLANS-I
B378-101-80-44-0103	GENERAL ARRANGEMENT PLANS-II
B378-101-80-44-0108	STRUCTURAL CONFIGURATION - ELEVATIONS

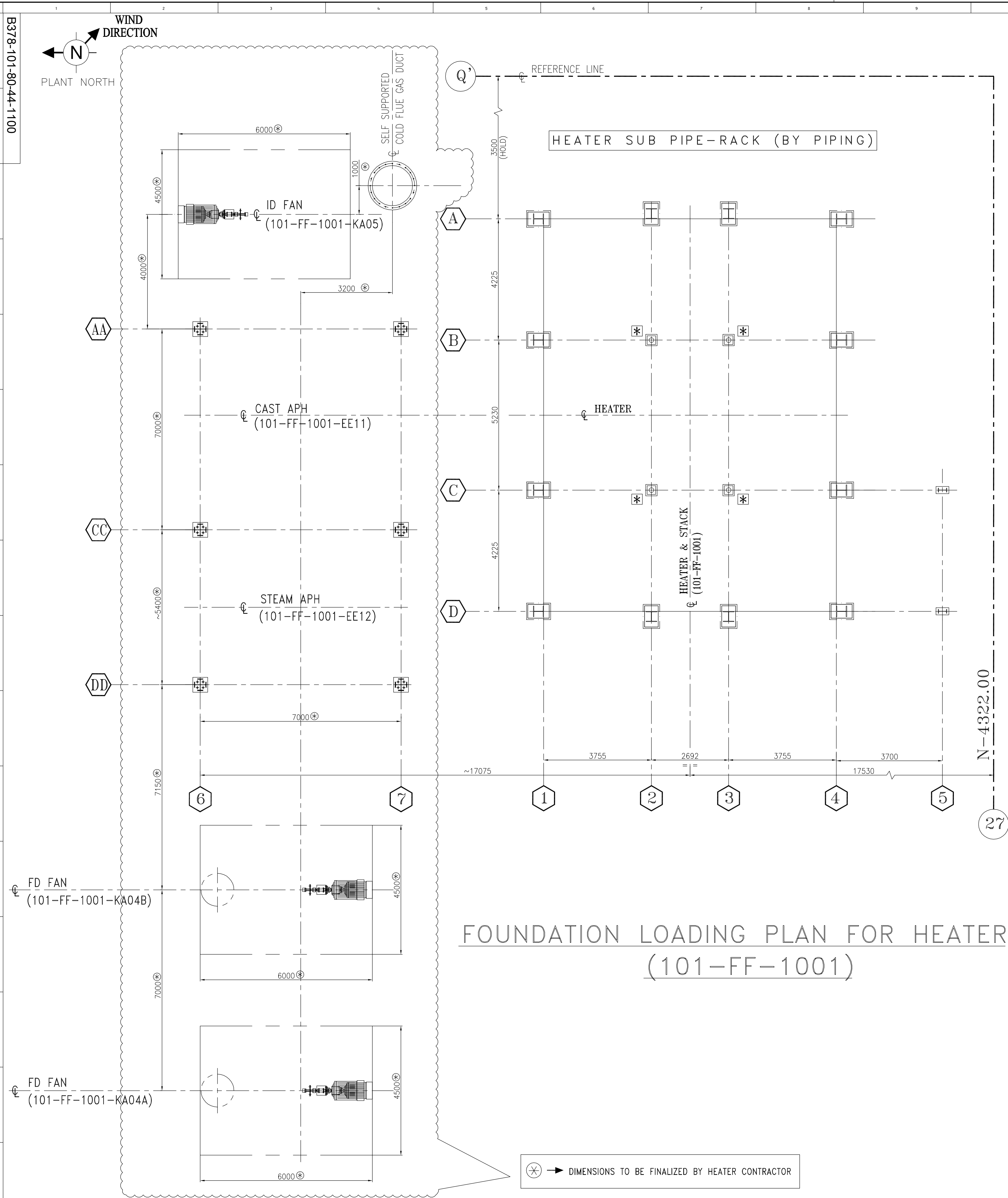
NOTES :-

- ALL PLATFORM TIEING MEMBER FROM COLUMN TO BE MIN. ISMB-200 U.O.N. OTHER TIEING MEMBER FROM HEATER TO PLATFORM TO BE ISMC-150 AS A MIN. U.O.N.

REV.	DATE	REVISIONS	BY	CHKD	APPD	PERMD
B	19.05.2022	ISSUED FOR ENGINEERING	MB	AV	RP	
C	27.01.2022	ISSUED FOR ENGINEERING	MB	AV	RP	
B	07.01.2022	ISSUED FOR BIS/COMMENTS	MB	AV	RP	
A	10.08.2021	ISSUED FOR BIS/COMMENTS	MB	PK/AV	RP	

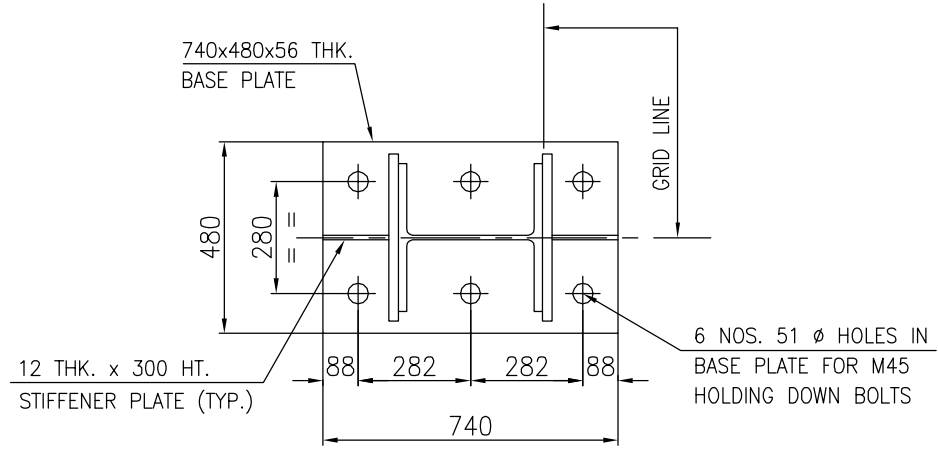
गैल इंडिया लिमिटेड GAIL (INDIA) LIMITED USAR, MAHARASHTRA	गैल इंडिया लिमिटेड ENGINEERS INDIA LIMITED (A Joint Venture Undertaking)
500 किलोघॅर पीडीएस पीपी परियोजना उसर महाराष्ट्र	500 KTA PDH - PP PROJECT USAR, MAHARASHTRA INDIA
संरचनात्मक विन्यास - योजना REACTOR CHARGE HEATER (101-PF-10001)	STRUCTURAL CONFIGURATION - PLANS REACTOR CHARGE HEATER (101-PF-10001)
SCALE	JOB NO.
1:56.6	B 3 7 8 1 0 1
UNIT	DIVN DEPT
	8 0 4 4 0 1 0 9 0
DWG NO.	REV.

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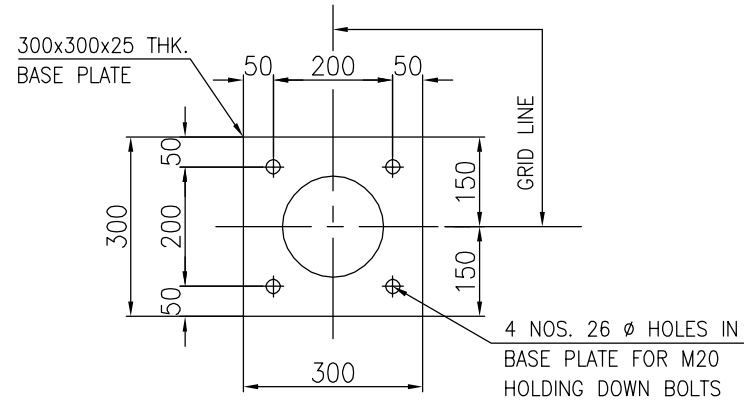


FOUNDATION LOADING FOR REACTOR CHARGE HEATER (101--FF--1001)														
(LOADS IN METRIC TONNES, AT EL.+2000)														
COL. NO.	GRAVITY LOAD (INCLUDING LIVE LOAD)		WIND LOAD				EARTHQUAKE LOAD				PIPING LOAD			
			W ← E		E → W		N ← S		S ← N		W ← E		E → W	
	MAX.	MIN.	V	H	V	H	V	H	V	H	V	H	V	H
1-A	100	35	±3	±44	±17	±69	±17	±47	±10	±44	±10	±2	±5	
1-B	100	35	±13	±12	±2	±40	±17	±10	±3	±22	±10	±4	±1	
1-C	100	35	±13	±12	±2	±40	±17	±10	±3	±22	±15	±4	±1	
1-D	100	35	±13	±44	±17	±69	±17	±47	±10	±44	±29	±4	±5	
2-A	95	35	±4	±28	±13	±17	±6	±25	±8	±10	±5	±2	±5	
2-D	95	35	±4	±28	±13	±17	±6	±25	±8	±10	±15	±2	±5	
3-A	95	35	±4	±28	±13	±17	±6	±25	±8	±10	±5	±2	±5	
3-D	95	35	±4	±28	±13	±17	±6	±25	±8	±10	±10	±2	±5	
4-A	93	35	±13	±44	±17	±69	±17	±47	±10	±44	±21	±4	±5	
4-B	93	35	±13	±12	±8	±40	±17	±10	±3	±22	±5	±4	±1	
4-C	93	35	±13	±12	±8	±40	±17	±10	±3	±22	±1	±4	±1	
4-D	93	35	±13	±44	±17	±69	±17	±47	±10	±44	±1	±4	±5	
(LOADS IN METRIC TONNES, AT EL.+300) (FOR STAIRCASE COLUMN)														
5-C	20	7	±3	±5	±4	±10	±3	±6	±3	±6	±2	±1	±1	
5-D	20	7	±3	±5	±4	±10	±3	±6	±3	±6	±2	±1	±1	

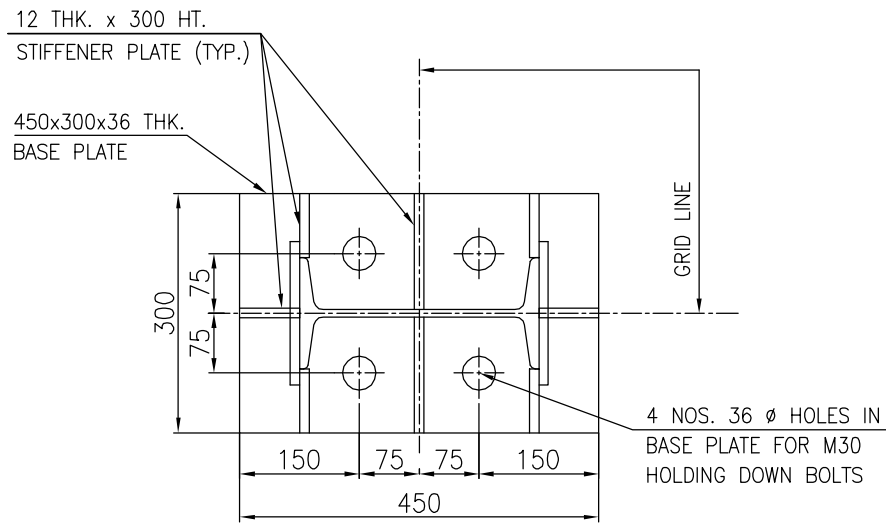
THE COLUMN MARKED ***** TO BE DESIGNED FOR GRAVITY LOAD = 15 TONS,
UPLIFT = 4 TONS & HORIZONTAL SHEAR = 3 TON



BASE PLATE DETAIL
COLUMNS NO. 1-A, 1-B, 1-C, 1-D,
2-A, 2-D, 3-A, 3-D,
4-A, 4-B, 4-C & 4-D
U/S BASE PLATE EL.+2000



BASE PLATE DETAIL
COLUMNS NO. 2-B, 2-C, 3-B & 3-C
U/S BASE PLATE EL.+300

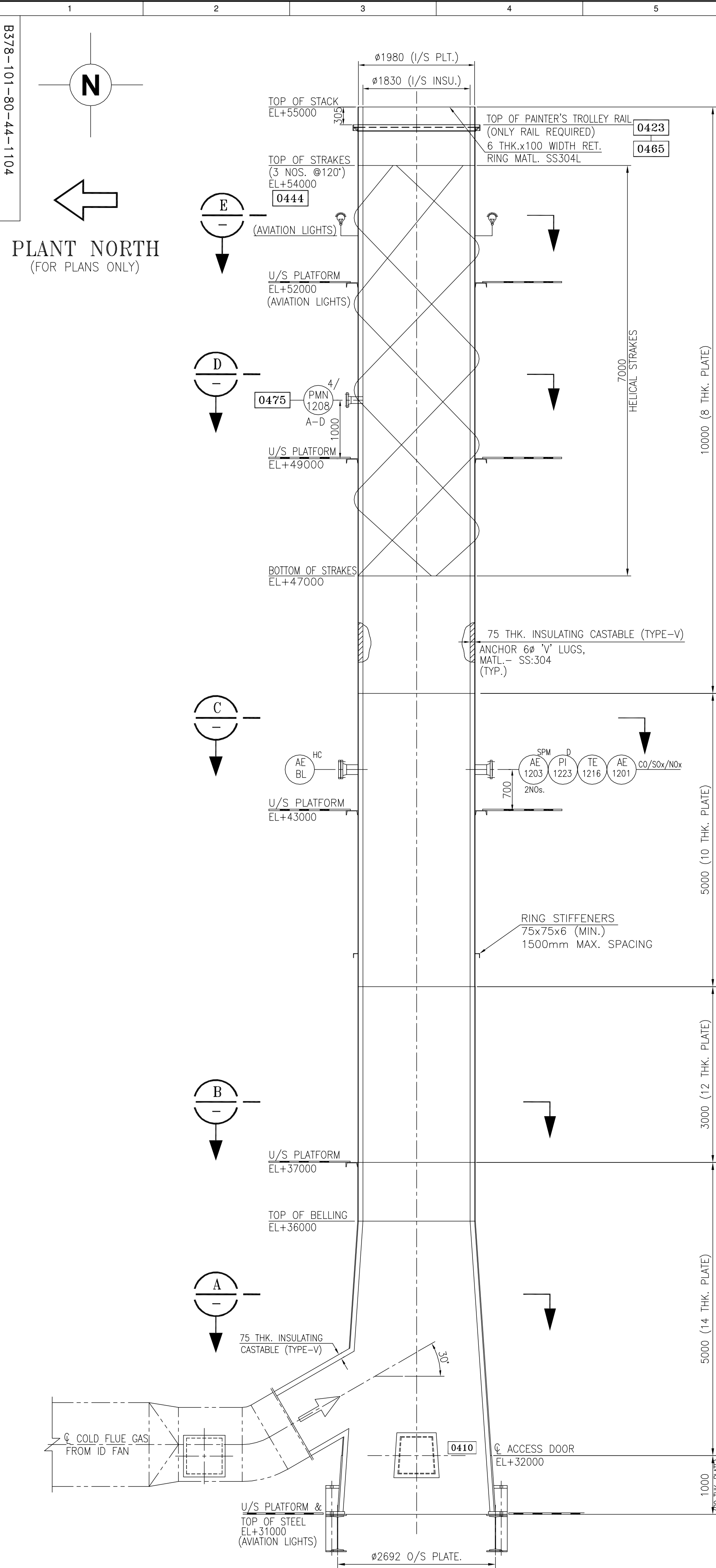


BASE PLATE DETAIL
COLUMNS NO. 5-C & 5-D
U/S BASE PLATE EL.+300

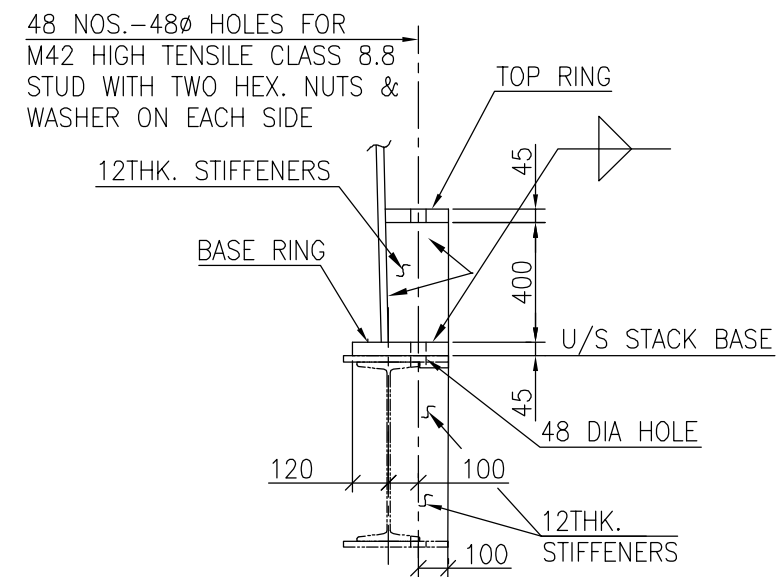
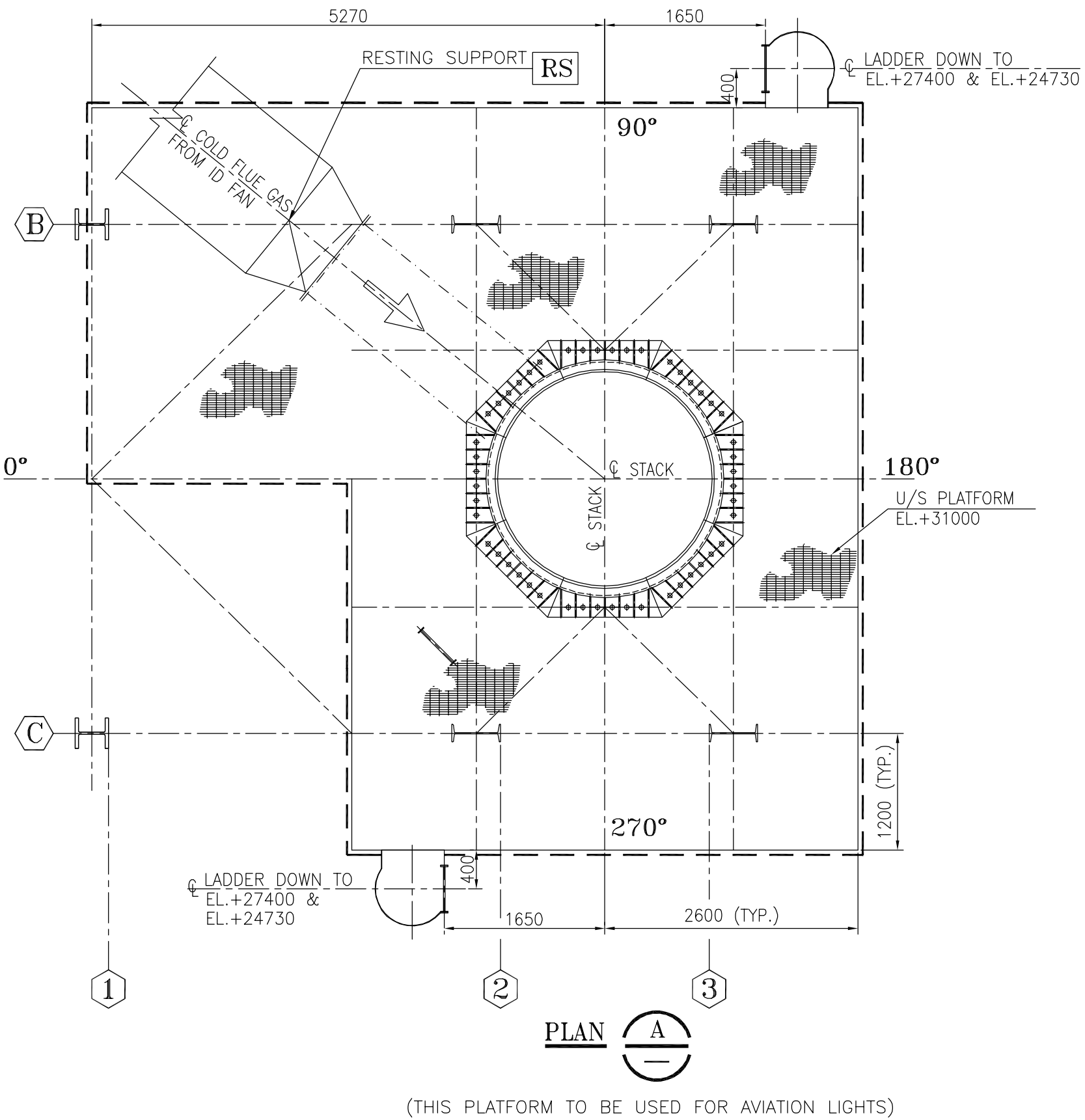
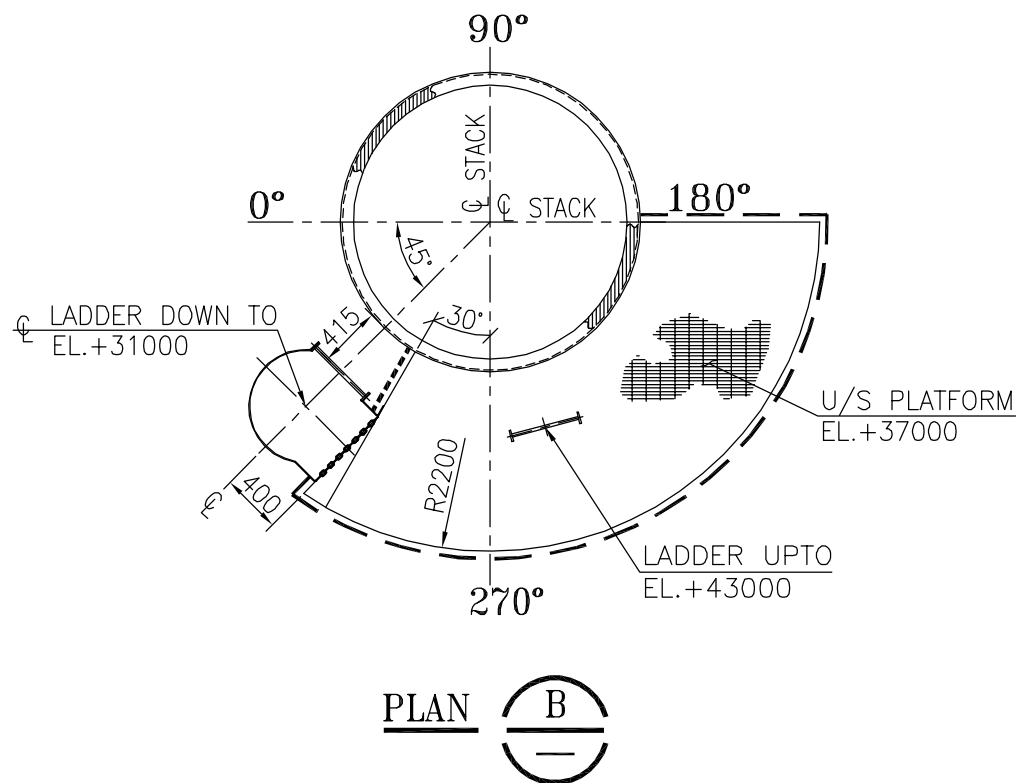
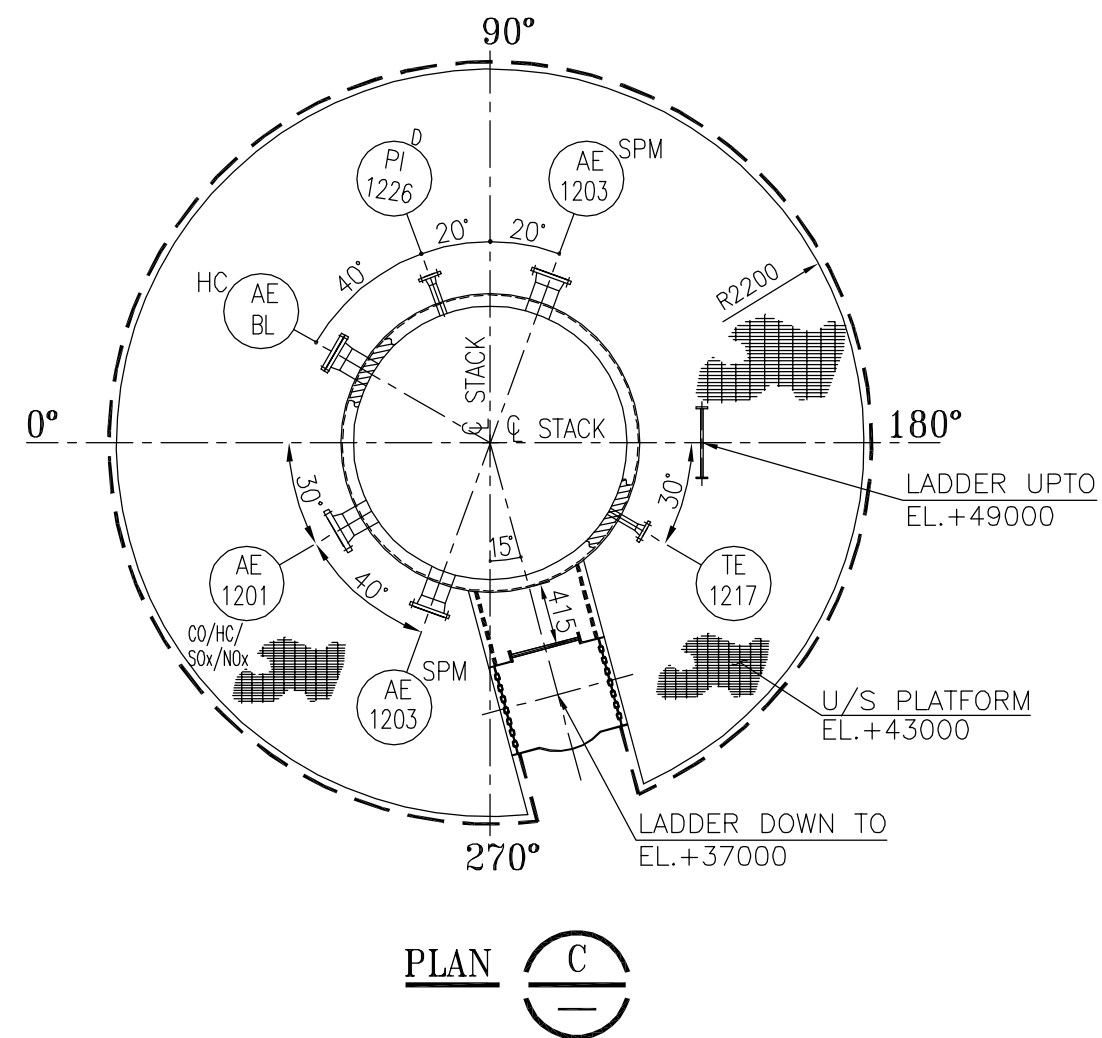
[illegible]

प्रस्तुत आदेश एवं समस्त निहित विवरण इंजीनियर्स इंडिया लिमिटेड की संपत्ति है। ये समग्र उधार दिए गए हैं और आमतौर पर यह स्पष्ट सम्बंधिता किया है कि न तो उन्हें नष्ट, पुनर्दिष्ट किया जाएगा, न मरुत की जायेगी, न खराब करे जायेगा, न प्रदर्शित किया जायेगा, न ही सीमित और निजी प्रयोग के अलावा इसका कोई अन्य प्रयोग होगा और यह प्रयोग खराब करे वाले इष्टा उपयोगकर्ता को निषिद्ध रूप में दो गार्ड सदस्य से होगा।

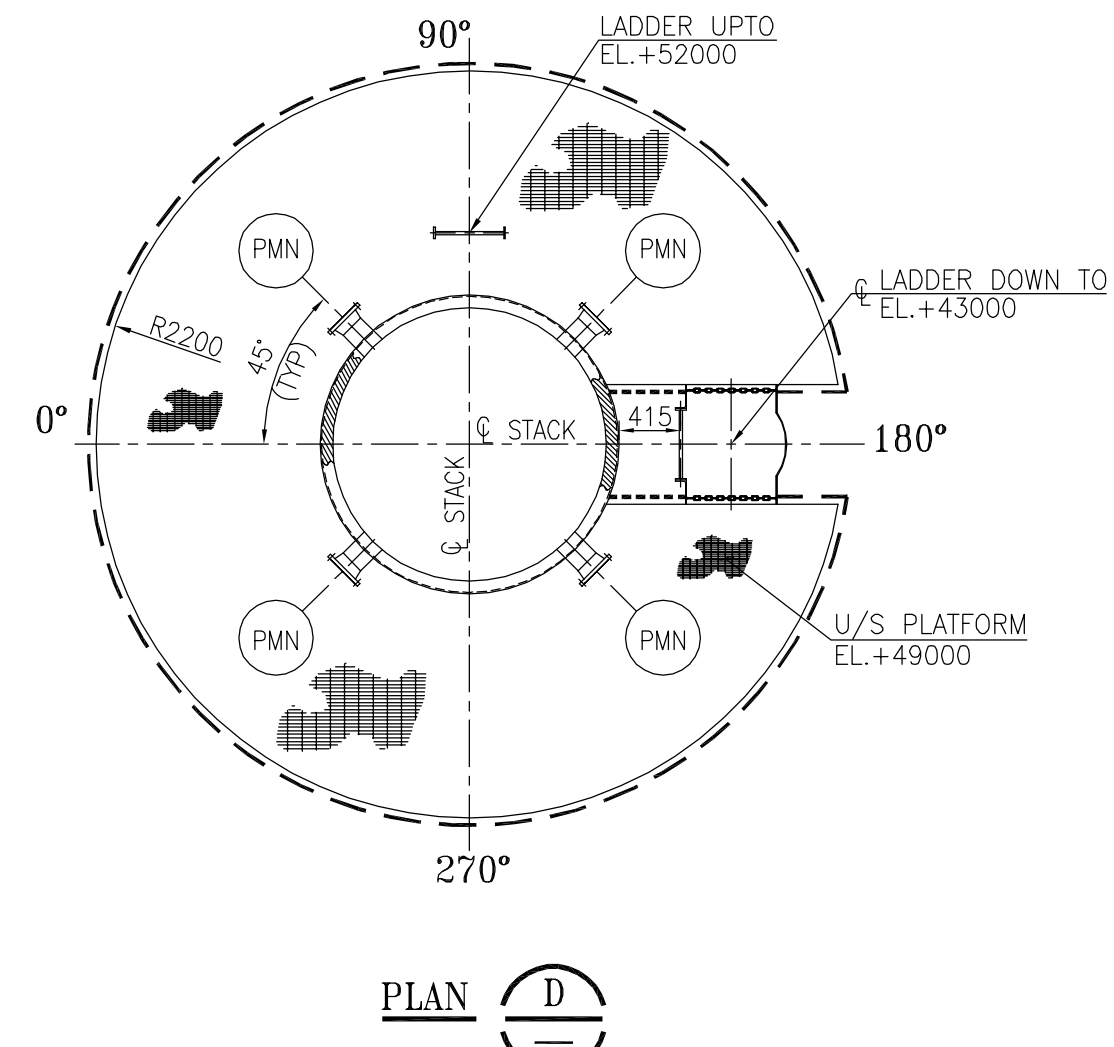
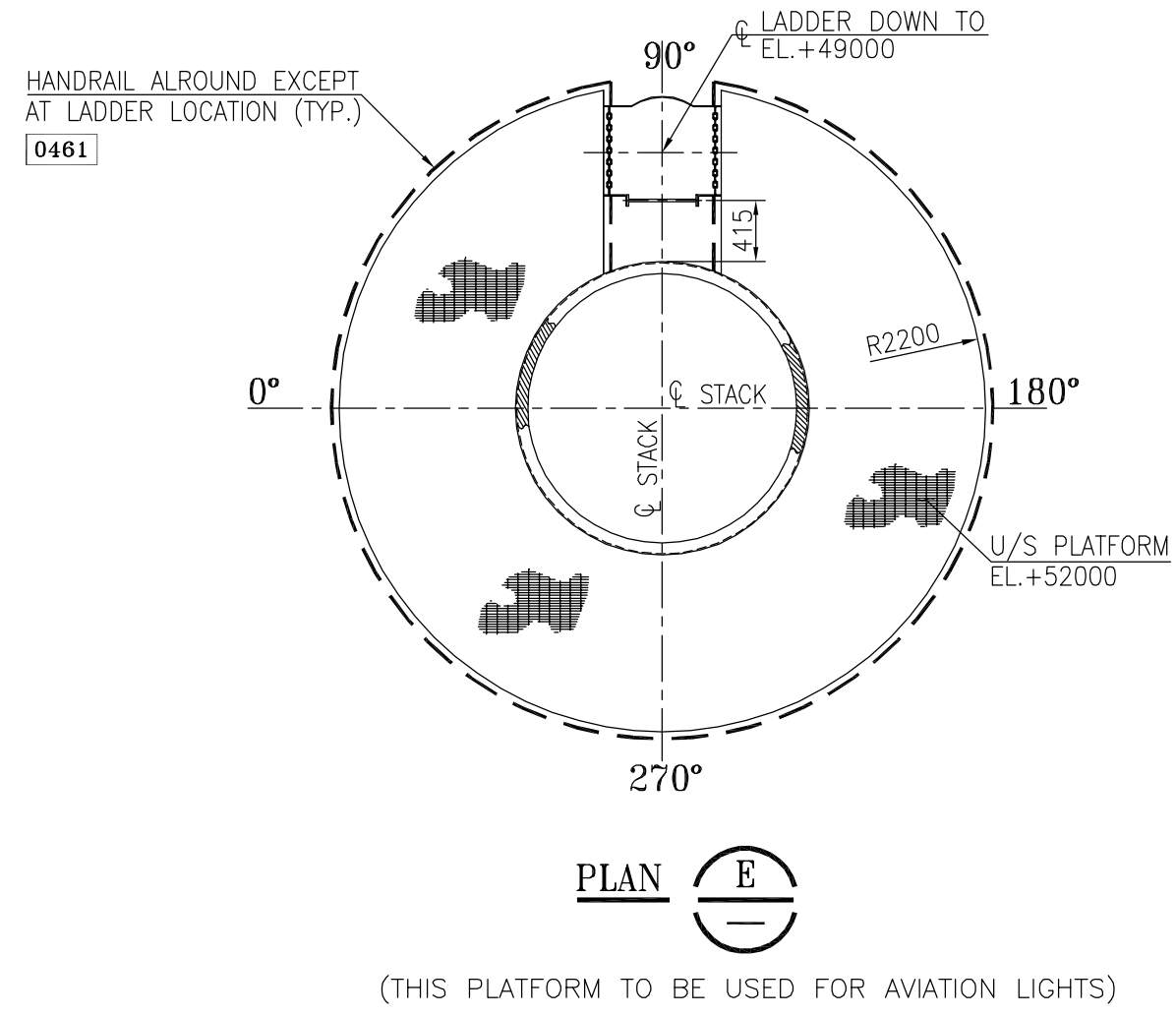
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ELEVATION OF STACK



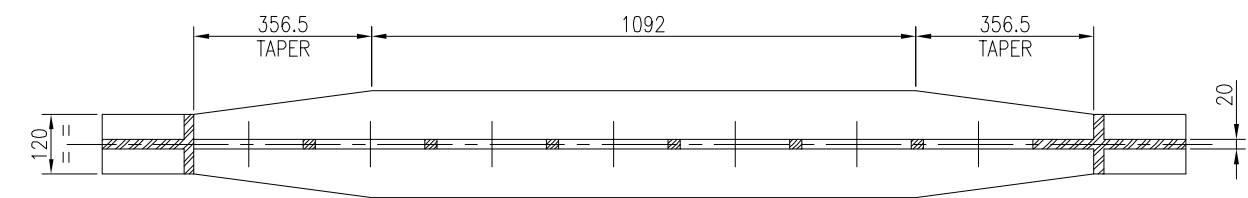
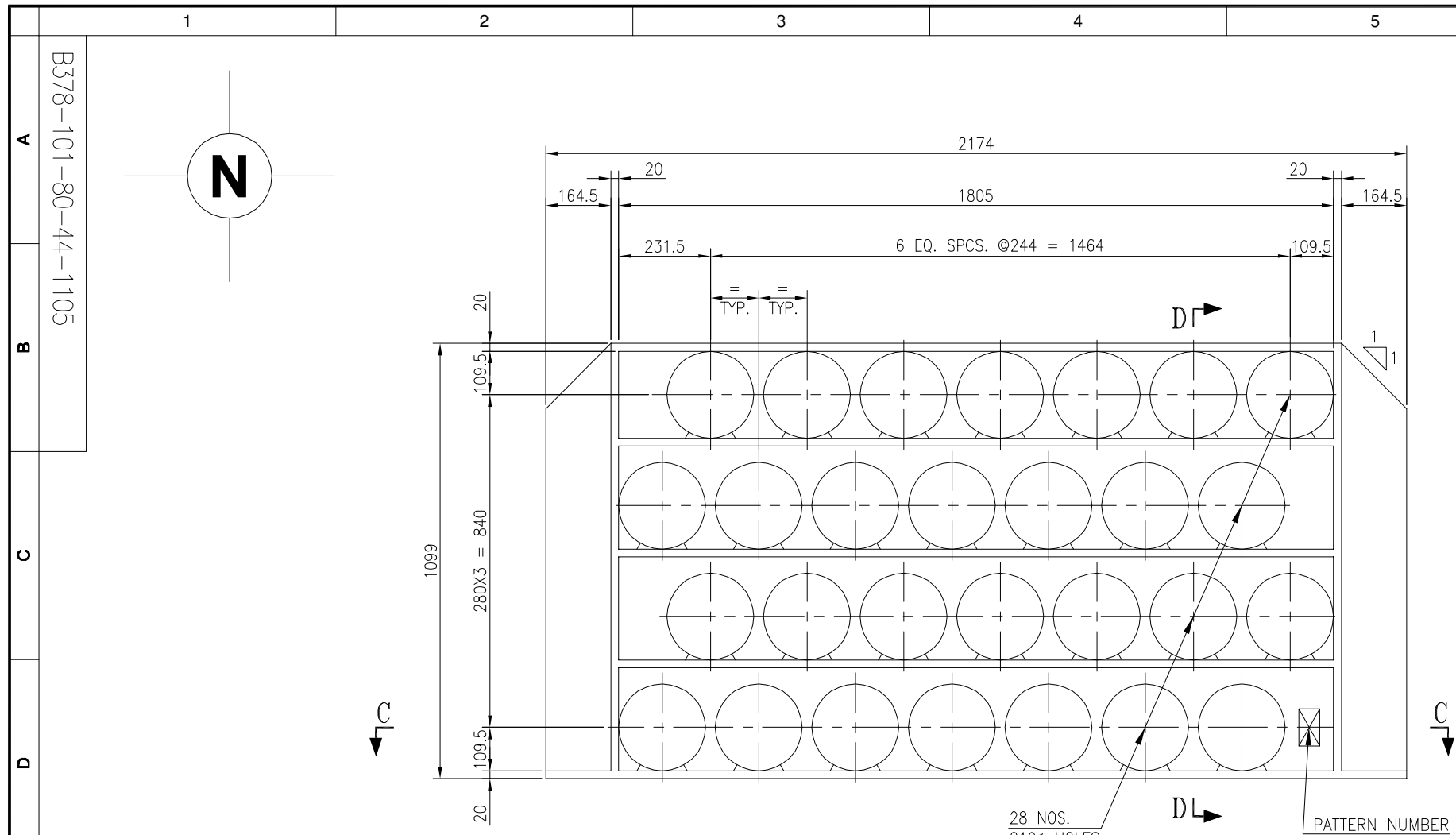
STACK CHAIR DETAIL



14		15		16	
REF. DWG. NO.		REFERENCE DRAWING TITLE			
B378-101-80-44-0101		GENERAL ARRANGEMENT CROSS SEC. & LONGITUDINAL SEC.			
NOTES :-					
1. ALL DIMENSIONS ARE IN MM U.N.O.					
2. ALL STACK FIELD SPLICE JOINTS, SHALL BE INITIAL BOLTED & THEN FULL STRENGTH WELDED; MAX. NUMBER OF FIELD SPLICE JOINT SHALL BE LIMITED TO 2 NOS. COMPLIANCE TO SPLICE STANDARD 7-17-0428 IS MANDATORY.					
3. ALL ERECTION BOLTS SHALL BE LEFT IN POSITION.					
4. STACK SHALL BE FABRICATED IN CONFORMITY WITH RELEVANT SPECIFICATIONS ENCLOSED WITH THE TENDER.					
5. STACK SEGMENTS SHALL BE REFRACTORY LINED AT GROUND & HEAT DRIED OUT AT 400°C BEFORE ERECTION.					
6. DUCT CUTOUT SHALL BE STIFFENED AS PER 100% AREA/MOMENT OF INERTIA COMPENSATION.					

प्रष्ठुत आर्थ एव समस्त निहित विद्यमान इन्जिनियर्स इंडिया लिमिटेड को संपत्ति है। ये प्राप्त उधार दिए गए हैं और उधारकर्ता ने यह स्पष्ट समझौता किया है कि न तो उन्हें न तो उधारकर्ता को संपत्ति के अलावा इसका कोई अन्य प्रयोग होगा और यह प्रयोग उधार देने वाले द्वारा उधारकर्ता को लिवेली ब्लॉक में दो गई सदस्यीयता से होगा।

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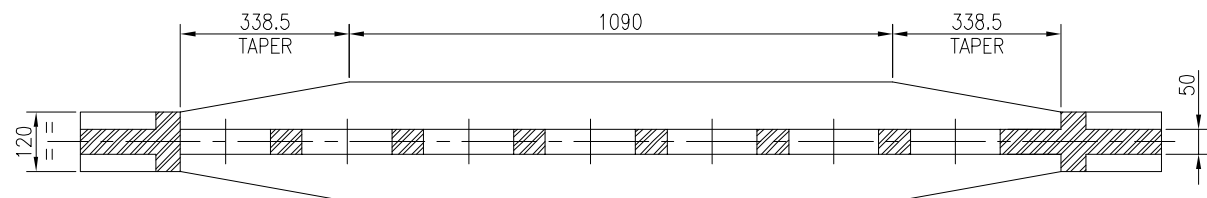
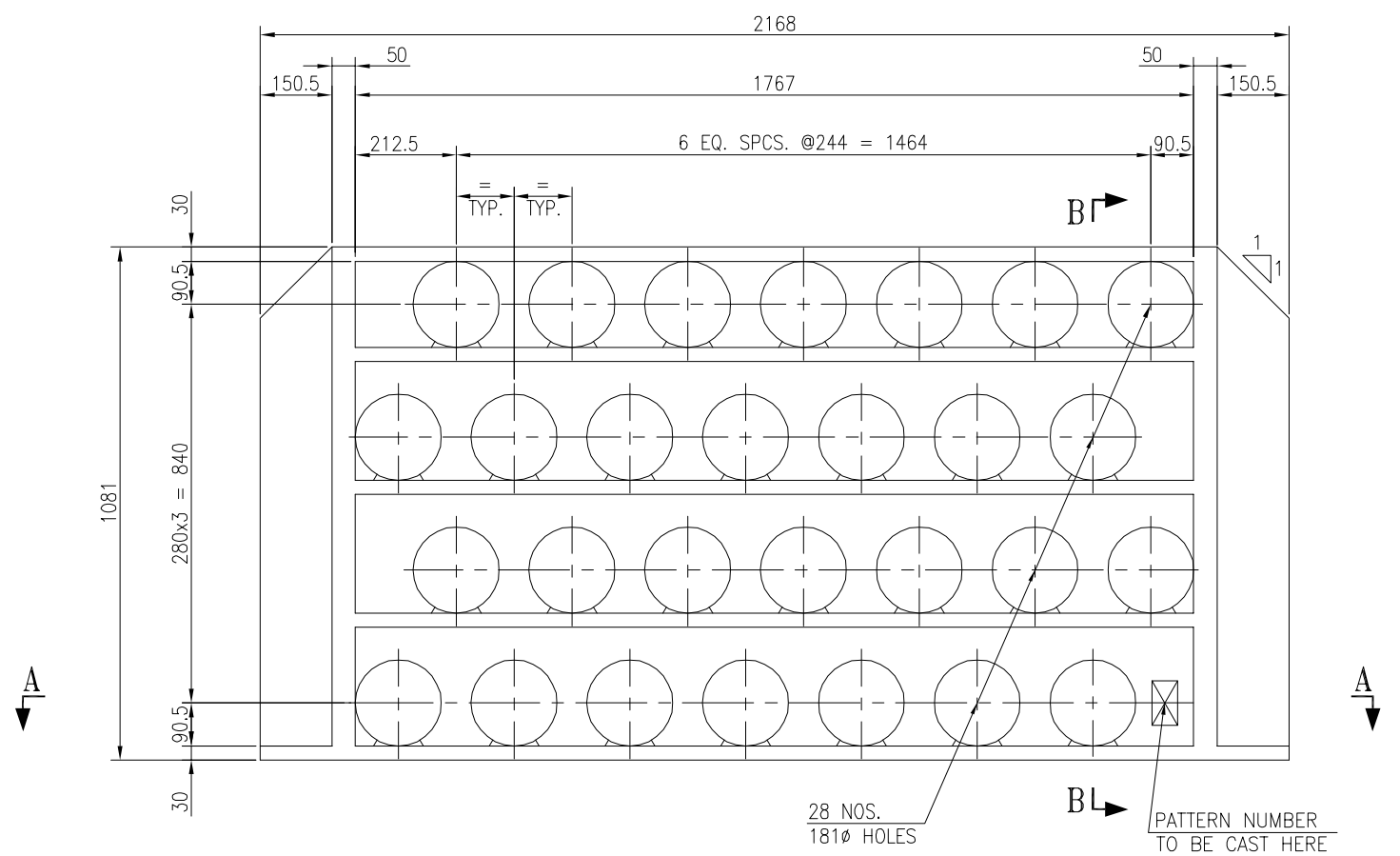
(REFERENCE EXPANSION DURING HEATER OPERATION=32mm)

SECTION C-C

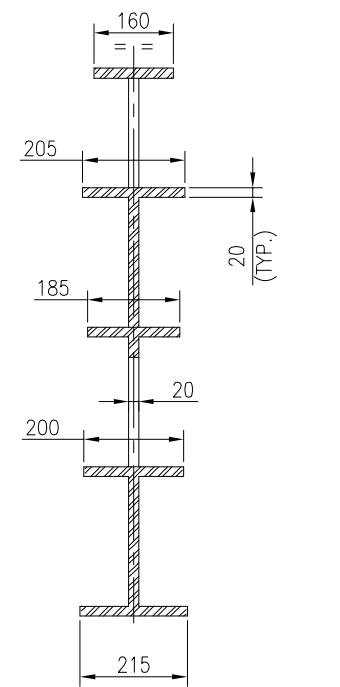
DETAIL OF INTERMEDIATE TUBE SHEET

PATTERN NO. B378/1612/101

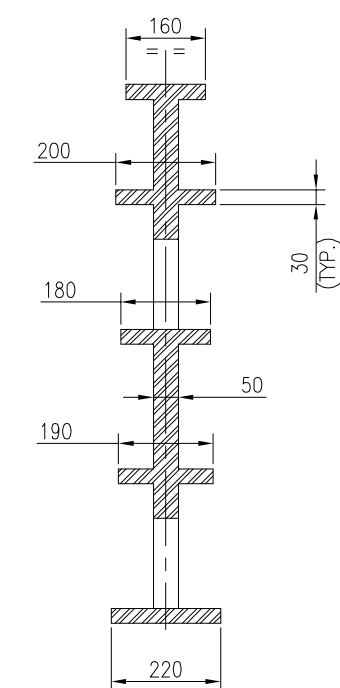
1612/101



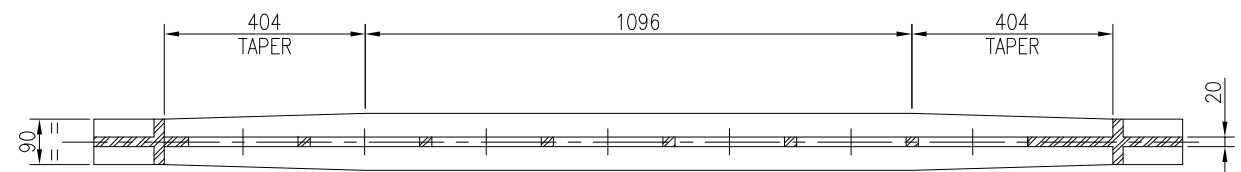
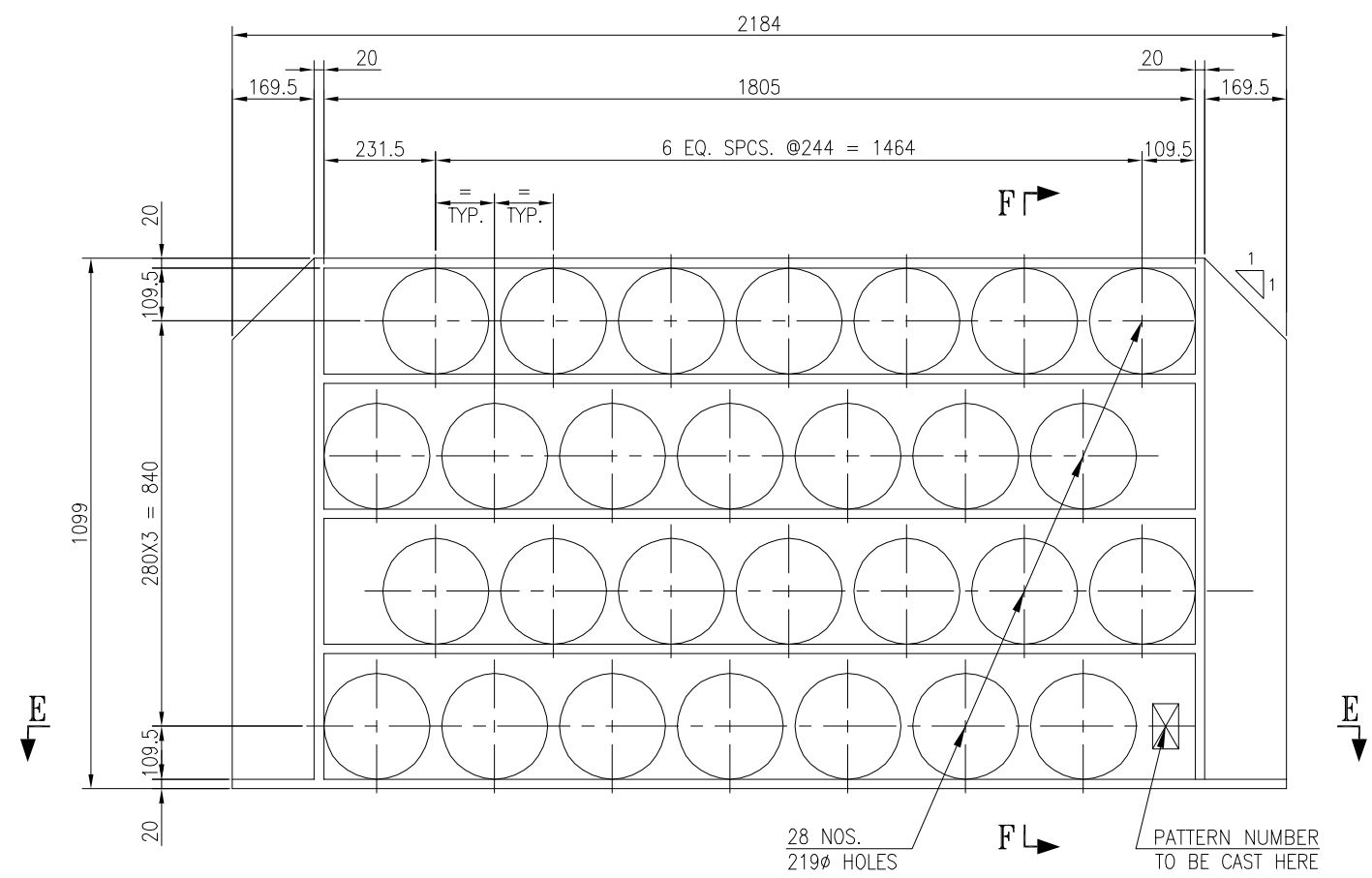
(REFERENCE EXPANSION DURING HEATER OPERATION=40mm)
SECTION A-A
DETAIL OF INTERMEDIATE TUBE SHEET
PATTERN NO. B378/1613/101 1613/101



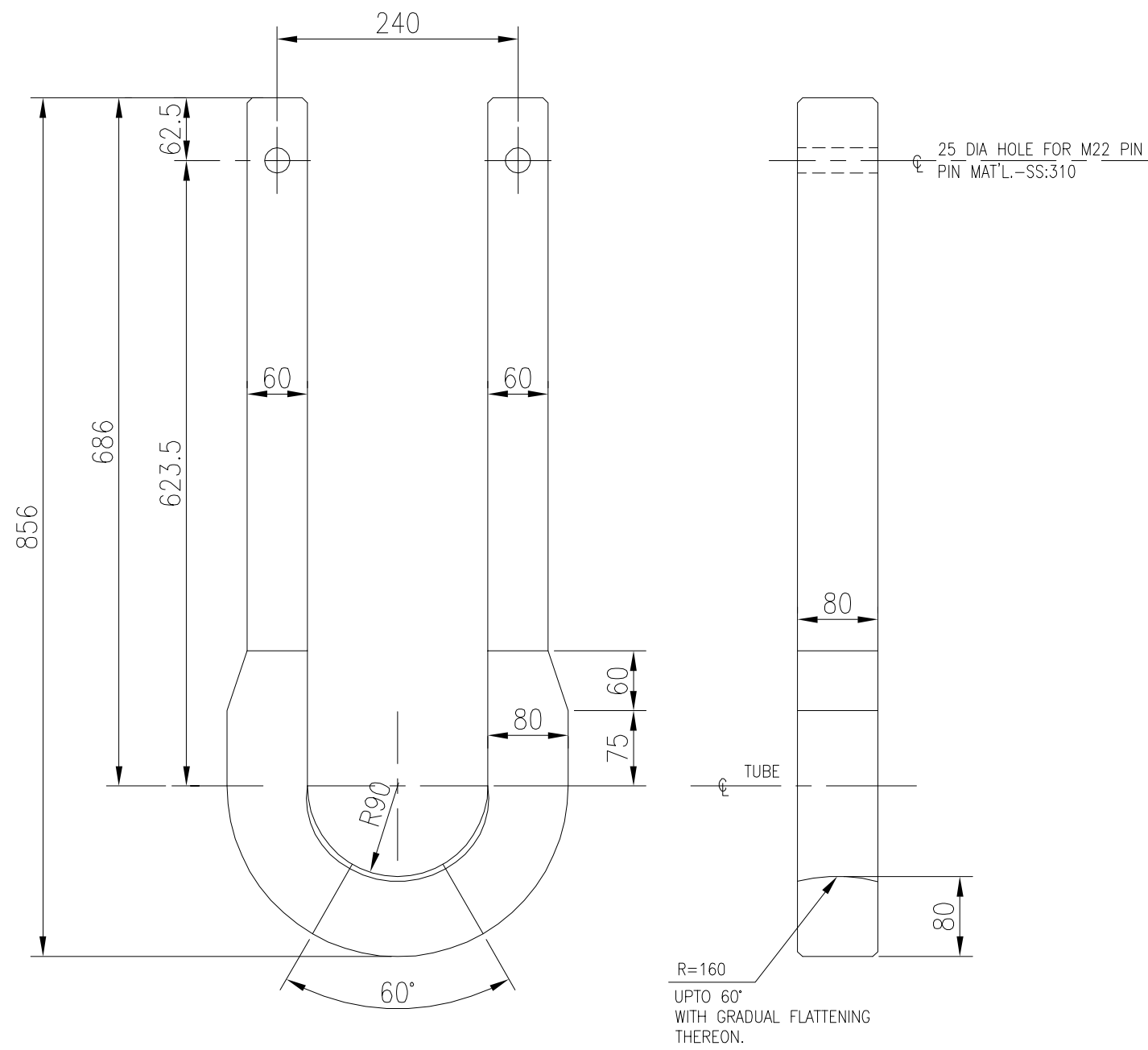
SECTION D-D



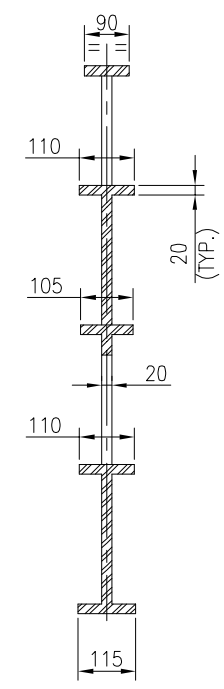
SECTION B-B



(REFERENCE EXPANSION DURING HEATER OPERATION=24mm)
SECTION E-E
DETAIL OF INTERMEDIATE TUBE SHEET
PATTERN NO. B378/1612/102 (1612/102)

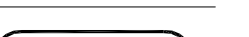


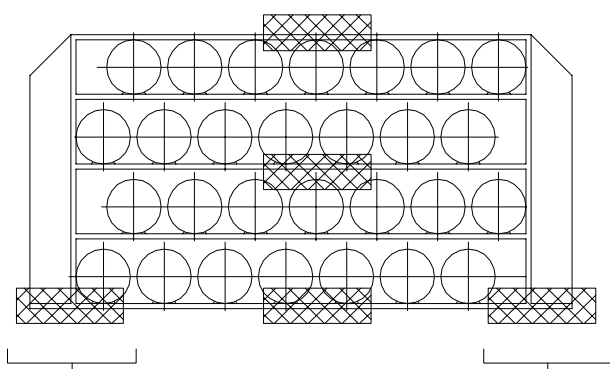
DET. OF RAD. TUBE HANGER
MATL.- A351 Gr. HK 40
PART NO. (B378/1623/201)



SECTION F-F

NOTES :-

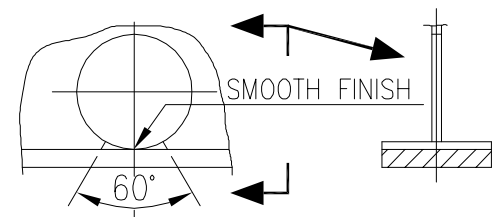
1. TYPICAL NOTATION
-  DENOTES PART NO.
2. ALL DIMENSIONS ARE IN mm U.O.N.
3. ALL BEARING SURFACES TO BE FREE FROM BURRS AND SHARP EDGES.
4. MANUFACTURE, TESTING AND SUPPLY ARE TO BE AS PER EIL STD. SPEC. FOR TUBE SUPPORT CASTING 6-17-0007 U.O.N. IN DRAWING.
5. AREAS OF RADIOGRAPHY ON PRODUCTION CASTINGS ARE INDICATED BY HATCHING  AS SHOWN BELOW



NO DRAFT ON SEATING SURFACE

INSPECTION OF CASTINGS SHALL CONFORM TO ASTM E 446 SEVERITY LEVEL 3 SHALL APPLY IN ALL CATEGORIES EXCEPT CRITICAL & FLANGE AREAS. CRITICAL AREAS (SUPPORT AREAS / BOTTOM FLANGE AREAS) SHALL CONFORM TO SEVERITY LEVEL 2.

6. 6 mm RADIUS ON EDGES AND CORNERS U.O.N EXCEPT AT HOLES.
7. HOLES TO BE IN LINE AND PARALLEL AND AT 90° TO THE WEB.
8. DOES NOT SCALE THE DRG. SEEK CLARIFICATION IF IN DOUBT.
9. SEEK CLARIFICATION IF ANY,BEFORE TAKING UP ACTUAL PRODUCTION OF CASTING.
10. ALL MATING PARTS SHALL BE CHECKED FOR CORRECT FIT AT SHOP PRIOR TO DESPATCH OF ALL ITEMS.
11. WEIGHT OF ALL CASTINGS SHALL BE WORKED OUT BY THE BIDDER & TO BE FURNISHED IN THE OFFER AS WELL AS IN THEIR RESPECTIVE FABRICATION DRAWINGS.
12. BEARING SEATS TO BE 30° EACH SIDE OF VERTICAL C OF THE HOLE FOR FULL WIDTH OF UNDERLYING FLANGE.



NO DRAFT ON SEATING SURFACE

13. ALL FLANGE WIDTHS SHALL BE SYMMETRICAL ABOUT $\frac{1}{2}$ OF ITS.
14. QUANTITIES SHOWN ARE INSTALLED QUANTITIES ONLY. HOWEVER, CONTRACTOR TO CHECK THE TOTAL NO. REQUIRED AS PER CAD. FOR SPARES REFER TENDER DOCUMENT.
15. IF DRAFT TAPER IS PROVIDED ON FLANGES, THE MIN. FLANGE THICKNESS SHALL BE MAINTAINED AS INDICATED. THE TOP SURFACE SHALL BE KEPT HORIZONTAL & THE BOTTOM SURFACE SHALL NOT PROJECT IN TO THE HOLE.
16. THE GAP BETWEEN OUTER EDGES OF THE ITS & INNER FACE OF CASING SHALL BE ENSURED TO ACCOUNT FOR THERMAL EXPANSION. THIS SHALL SUITABLY BE COVERED IN RELATED QP/ITP.

BILL OF MATERIAL FOR CAST TUBE SUPPORTS
(INSTALLED QUANTITIES EXCLUDING SPARES)

PART NO.	MATERIAL	FL STD. NO.	QUANTITY	REMARKS
CONVECTION INTERMEDIATE TUBE SHEETS				
1613/101	A 351 Gr HK 40	AS PER DETAIL	1	BOTTOM TUBE SHEET
1612/101	A 297 Gr HF	—DO—	1	2nd TUBE SHEET FROM BOTTOM
1612/102	A 297 Gr HF	—DO—	2	3rd & 4th TUBE SHEET FROM BOTTOM
CONVECTION ITS SUPPORT BRACKETS				
1623/101	A 351 Gr HK 40	7-17-0164	2	BOTTOM TUBE SHEET
1622/101	A 297 Gr HF	7-17-0163	2	2nd TUBE SHEET FROM BOTTOM
1622/102	A 297 Gr HF	7-17-0101	4	3rd & 4th TUBE SHEET FROM BOTTOM

RADIANT ROOF TUBE HANGER

1623/201	A 351 Gr HK 40	AS PER DETAIL	42	RADIANT ROOF TUBE HANGER
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O	19.05.2022	ISSUED FOR ENGINEERING	MB	PK/AV	RP	
C	27.01.2022	ISSUED FOR ENGINEERING	MB	PK/AV	RP	
B	07.01.2022	ISSUED FOR TENDER	MB	PK/AV	RP	
A	10.09.2021	ISSUED FOR BIDS/COMMENTS	MB	PK/AV	RP	

इंजीनियर्स
इंडिया लिमिटेड
(भारत सरकार का उपक्रम)



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 गेल इंडिया लिमिटेड
GAIL (INDIA) LIMITED
USAR, MAHARASHTRA

500 केटीए पीडीएच पीपी परियोजना उत्तर महाराष्ट्र	500 KTA PDH - PP PROJECT USAR, MAHARASHTRA INDIA
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ट्यूबशीट सपोर्ट कास्टिंग 101-FF-1001	TUBE SUPPORT CASTINGS 101-FF-1001
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SCALE	JOB NO.				UNIT			DIVN.		DEPT.		DWG. NO.				REV
1:10	B	3	7	8	1	0	1	8	0	4	4	1	1	0	5	0