

**TENDER NO:PSER:SCT:MDC-H1676:15**

**VOLUME -IF**

**TECHNICAL SPECIFICATION + SPECIAL CONDITIONS OF CONTRACT**

**FOR**

**ERECTION OF LOWER PIT LINER, PIPES, EMBEDDMENT IN FIRST  
STAGE OF UNIT-1 TO 4 & ASSEMBLY & TESTING OF DISTRIBUTOR  
ALONGWITH ASSOCIATED WORKS FOR ONE UNIT  
OF**

**4X180 MW MANGDECHHU HYDRO ELECTRIC PROJECT MHPA,  
BHUTAN**

**BHARAT HEAVY ELECTRICALS LIMITED**

**( A GOVT. OF INDIA UNDERTAKING )**

**POWER SECTOR – EASTERN REGION**

**PLOT NO. – 9 / 1, DJ – BLOCK,**

**SECTOR – II, KARUNAMOYEE,**

**SALT LAKE CITY,**

**KOLKATA – 700091.**

**BHARAT HEAVY ELECTRICALS LIMITED**  
**POWER SECTOR- EASTERN REGION**  
Plot no: 9/1, DJ Block, Sector-II, Salt Lake City Kolkata-700091

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## VOLUME - IF

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SECTION-I

PROJECT INFORMATION AND SCOPE OF WORK

1.0 PROJECT INFORMATION

1.0	Name of the project	:	4 x 180 MW Mangdechhu Hydro-electric Project, Bhutan
2.0	Nearest Railway Station	:	New Bongaigaon in Assam
3.0	Nearest Airport	:	Paro in Bhutan/ Guwahati in Assam/ Bagdogra in West Bengal
4.0	Location of site	:	Power House Site is located near Yurmu, 45 KMs away from Trongsa. The site storage yard is located at a distance of 12 KMs approximately from the Power House MAT.
5.0 Approximate road distance in Bhutan :			
	From	To	Distance in KMs
	Trongsa	Thimphu	203.00
	Trongsa	Phuentsholing	375.00
	Gelephu	Project site	260.00
	Gelephu	Bongaigaon	68.00
	Gelephu	Kolkata	890.00

Bidder's are advised to visit location of the Work Place(s) in Bhutan at their cost and obtain all first hand information before quoting. No claim of the contractor in this regard shall be entertained by BHEL in the future.

## 2.0 SCOPE OF WORK:

- (i) **Lower Pit Liner of Unit 1, 2, 3 & 4:**
  - a) Placement of lower pit liner segments in position, matching, welding and alignment and leveling as per instructions and procedure contained in the drawings. Welding electrodes shall be issued to the Contractor by BHEL as free issue items.
  - b) Erection of all anchors, stays, inserts plates etc. as per drawing as required to handover the liner for concreting.
- (ii) **Erection of all pipes inside concrete and embedment in first stage as per instructions and procedure contained in the drawings, up to EL 1010 mtr. for Unit 1, 2, 3 & 4.** Welding electrodes shall be issued to the Contractor by BHEL as free issue items.
- (iii) **Receipt, unloading (from truck/trailer), verification, storage, preservation of materials and handing over for erection, local transportation from place of storage to place of erection.**
- (iv) **Assembly, welding, NDT, hydro test of one distributor of any one unit along with associated works as per instructions and procedure contained in the drawings. to handover it for concreting.** Welding electrodes shall be issued to the Contractor by BHEL as free issue items.

### NOTE:

1. **Details of items to be erected are as per Annexure-1 & 2.**
2. NDT of the entire site welded joints is to be done as per drg.
3. The edge of embedded pipes is to be kept at least 300mm projected from concrete surface and plugged.
4. Painting as per drawing. Paints shall be provided by BHEL as free issue item.
6. EOT crane of 35 T capacity shall be available in the power house free of charge. However operator for same shall be arranged by the contractor. All other handling equipment are in contractor's scope.

7. All the T&P and consumables required for the works under the scope shall be provided by contractor except test devices of distributor which will be supplied by BHEL plant.

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### SECTION-II

#### GENERAL TECHNICAL REQUIREMENT

##### **1.0 GENERAL**

- 1.1 The contractor shall provide all types of labour, supervisors, engineers, watch and ward as required, tools/ tackles and consumables as required/specified under various clauses of tender specification.
- 1.2 The contractor shall ensure good quality and accurate workmanship for proper performance of equipment. BHEL site engineer will be the deciding authority with respect to the quality requirements.
- 1.3 Temporary lighting and ventilation of the work area shall be in the scope of the contractor.
- 1.4 All consumables, required for qualitative and timely completion of the work shall be arranged by the contractor, excepting those specified as BHEL supply in the tender specification.

Storage of electrodes shall be done in controlled humidity conditions, as per requirement, by the contractor at his own cost.

All electrodes shall be dried in electrodes drying/ baking oven to the temperature and period specified by BHEL Engineer before they are used in erection work and each welder should be provided with one portable electrode drying oven at the work spot. The contractor shall arrange electrode drying/baking ovens and the portable electrode drying ovens.

##### 1.5 Inspection/Quality Assurance/Quality Control

- 1.5.1 All works carried out, operations done, equipment, piping and accessories assembled, erected, tested & commissioned covering the total scope of this specification shall be subjected to inspection by BHEL / Customer's engineers at different stages as well as finally on completion of activity / part activity as decided by BHEL / Customer's Engineer.
- 1.5.2 The contractor has to follow BHEL FOA checklists for erection, testing and commissioning of the total work covered under this specification.

- 1.5.3 The protocols between contractor and BHEL /Customer shall be made prior to commencement of erection regarding taking over of reference levels and lines as reference for erection and correctness of foundation in respect of lay out, levels etc.
- 1.5.4 Preparation of Quality Assurance log sheets and protocols with BHEL and Customer's engineers, welding logs and other Quality control and Quality Assurance documentation as per BHEL engineer's instructions is within the scope of the contractor.
- 1.5.5 A daily logbook shall be maintained by every supervisor / engineer of the contractor on the job in duplicate (one for BHEL and one for the contractor) for detailing and incorporating alignment / clearances / leveling readings and inspection details of various equipment. All important measurements shall be recorded in the daily logbook with sketches based on drawings indicating readings / measurements actually taken and signed by BHEL / Customer / Contractor's representative.
- 1.5.6 Approval given by BHEL for welding, results of various tests shall also be recorded. High pressure welding details like Joint no., welder's name, date of welding, details of repair etc., likewise Radiography and stress relieving details and heat treatment details shall also be recorded.
- 1.5.7 All the electrical / mechanical measuring and testing instruments, feeler gauges, height gauges, dial gauges, micrometers, spirit levels, surface plates, straight edges, vernier calipers and all other instruments as per the instructions of BHEL Engineer shall be provided by the contractor for checking, leveling, alignment, centering etc. of the erected equipment at various stages.
- 1.5.8 The instruments / gauges tools etc. provided should be to the precision and accuracy specified by BHEL engineer and should have necessary calibration and other certificates as per the requirement of BHEL engineer. Decision of BHEL engineer on acceptance of the measuring instruments for the work under this specification shall be final and binding on the contractor. The calibration and periodicity of calibration of contractor's IMTE's shall be as per BHEL's approved Quality Assurance Manual and has to be done at his cost. The calibration plan of IMTEs should be made in such a manner that work does not suffer due to non-availability of calibrated IMTEs. If required alternative arrangement is to be done by the contractor.
- 1.5.9 It is not obligatory on the part of BHEL to provide any tools and tackles or other materials other than those specifically agreed to

do so by BHEL. However, depending upon the availability, BHEL / BHEL's Customer handling equipment and other plants may be made available to the contractor on payment of higher charges as fixed, subject to the conditions laid down by BHEL/Customer from time to time. Unless paid in advance, such hire charges, if applicable shall be recovered from contractor's bill /security deposit or any other payment in one installment.

**1.5.10. GENERAL TECHNICAL REQUIREMENT FOR MATERIAL HANDLING PRESERVATION, UPKEEPMENT, MAINTENANCE AND CONSERVATION OF MATERIALS**

1.5.10.1 Providing required manpower including supervision, material handling equipments [tools and plants] and consumables, as required, for execution of the material handling work which includes unloading of all materials from Trucks / Trailers at Mangdechhu HEP Site Stores/ Storage yard/ Power House, Verification, stacking, preservation/ conservation as required, issue of material to the erection agency of BHEL, loading on Truck/ Trailers for local transportation, if any, material reconciliation at Mangdechhu Hydro Electric Project, Bhutan. Open and closed storage yard shall be provided by BHEL.

The contractor shall stack the materials as per grid plan of BHEL, maintain proper 'house keeping', maintain and upkeep entire storage area and passage for smooth material handling as per BHEL instructions.

Contractor shall remove grass, bushes, trees etc from the entire land & adjoining areas provided to him (open yard, covered/semi-covered sheds) on daily basis .

1.5.10.2 Upkeepment, maintenance and conservation of material during storage period shall be included in the contractor's scope. Contractor shall carry out the work as per instruction of BHEL's Site Engineers. However, storage and preservation manual of BHEL is enclosed for guidance.

**1.5.11 TOOLS AND PLANTS**

The Contractor shall mobilize adequate nos. of T & Ps and IMTEs that are required for work, as per instruction of BHEL's Construction Manager at Site as per Work requirement. Decision of BHEL's Construction Manager shall be final and binding on the Contractor.

General material handling accessories like D-shackles, slings, wire rope, tripods, winches, max puller, pulley blocks, jacks etc. are to be provided as per requirement. Vehicles for transportation of materials from place of storage to place of erection, if required, shall also be arranged by the Contractor at his costs.

The contractor at his cost shall arrange operator, diesel, petrol and other consumables required for the tools and plants, equipments etc, to be provided by him. Preventive and routine maintenance of tools and plants are to be arranged by the contractor at his cost without any delay. Required fuel, for these equipments and maintenance of the same will be contractor's responsibility.

## **1.6 INSURANCE**

Insurance for Plant Materials shall be the responsibility of BHEL. The contractor has to take Insurance Cover for his manpower and T&P involved. Documents in this regard must be produced by the contractor as and when asked for by BHEL Site In-charge or Project Manager. The expenditure in this regard shall be borne by the contractor.

### **For plant materials**

- (i). In case of any kind of loss / theft of any consignments while in his custody, the contractor has to do all legal actions required with the Concerned Authority (like lodging of F. I. R. etc..) and arranging of required documents from the concerned authority for lodging of insurance claim and coordinate with BHEL, to submit the claim papers to the Insurance underwriters.
  
- (ii). In case of any kind of accidental damage to any consignments while in his custody, the Contractor has to make a joint statement with BHEL and coordinate with BHEL, to consolidate the claim on the Insurance Underwriters. No payment shall be released against the consignments in question till claim papers are submitted to insurance.

## **1.7 SAFETY**

- 1.7.1 The contractor shall ensure the safety of all workmen, materials and equipment either belonging to him or to others working at site. He shall observe safety rules and codes applied by BHEL at site without exception. In conjunction with the above, the contractor has to follow the local safety rules.

1.7.2 Non-conformity of safety rules and safety appliances will be viewed seriously and BHEL has right to impose fines on the contractor on each incident/each non-conformity as per details given below :

SL.No	S A F E T Y REQUIREMENT	FINE (RS.)
01.	Not Wearing Safety Helmet	50/- Per Incidence
02.	Not Wearing Safety Belt	100/- Per Incidence
03.	Grinding Without Goggles	50/- Per Incidence
04.	Not Using 24 V Supply For Internal Work	500/- Per Incidence
05.	Electrical Plugs Not Used For Hand Machines	100/- Per Incidence
06.	Not Slings Properly	200/- Per Incidence
07.	Using Damaged/non tested Sling	200/- Per Incidence
08.	Lifting Cylinder Without Cage	500/- Per Incidence
09.	Using Welding Cables/Electrical Wires Having Lot Of Joints And Not Insulated With Proper /Standard Cable Insulating Materials	200/- Per Incidence
10.	Not Wearing Hand Gloves	200/- Per Incidence
11.	Gas Cutting Without Taking Proper Precaution/Not Using Sheet Below Gas Cutting	100/- Per Incidence
12.	Improper Earthing Of Electrical T&P	200/- Per Equipment
13.	Not Protecting/Locating The Gas Cylinder To Avoid Catching Of Fire	100/- Per Incidence

Any other non-conformity noticed but not listed above will also be fined. The decision of BHEL engineer is final on the above. The amount will be deducted from running bills of the contractor. The amount collected on the above will be utilized for giving award to the employee who could avoid accidents by following safety rules and for improving the safety at site.

1.7.3 The Contractor shall indemnify BHEL against all claims for injury or damage to any person or property caused by his negligence or negligence of his employee during the execution of the contract.

1.7.4 In case, an accident occurs, the contractor shall submit accident report, within 24 hrs. of its occurrence, as per the BHEL standard format.

1.7.5 In case of any recovery is made by customer MHPA due to lapses on the part of the contractor during execution, the same shall be

recovered on back to back basis from the contractor without prejudice to any other rights of the BHEL.

## 1.8 WARRANTY

Even though the work will be carried under the supervision of BHEL Engineer, the contractor will be responsible for the quality of the workmanship and shall stand warranty/guarantee for a period of 03 months from the item-wise date of handing over of each item (refer sl. no. 2.0 (i),2.0(ii) & 2.0(iv) of Section-I) for concreting and date of completion of work at sl. no. 2.0(iii) of Section-I. Contractor shall rectify free of cost all defects due to faulty work done. In the event of contractor failing to repair the defective works within the time specified by the Engineer, BHEL may proceed to undertake the repairs of such defective works at the contractor's risk and expenses without prejudice to any other rights and recover the same from security deposit/other dues. Warranty period for each item will be considered separately.

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SECTION-III

SPECIAL CONDITION OF CONTRACT

**1.0 TIME SCHEDULE**

- 1.1 The entire work covered in this tender up to handing over to customer/BHEL shall be completed within a period of 10 months (Ten months) from the date of start of work.

Date of start of work will be certified by the Construction Manager BHEL, MHEP site depending on availability of fronts.

- 1.2 The contractor shall start mobilizing within 10 days from the date of notification by Construction Manager, BHEL, and MHEP Site and complete the mobilization as required prior to start of erection as per the instruction of BHEL Construction Manager.

**2.0 CONSTRUCTION POWER & WATER AND LAND**

Construction Power shall be provided on chargeable basis as per prevailing rate at MHEP site to the contractor. The present tariff of construction power at site is Rs 2.98 per unit of consumption. A point for taking construction power will be made available at the power house area. Contractor has to make arrangement for supply and installation of energy meter, switch board etc. of required capacity for taking construction power.

However contractor to have one suitable capacity DG set as standby in case of failure of regular construction power.

Contractor to arrange for construction water (including domestic water for his staff) at his costs.

Contractor to arrange accommodation for site office and labour colony for his staff.

**3.0 LIQUIDATED DAMAGES DUE TO DELAY IN COMPLETION**

- 3.1 **LIQUIDATED DAMAGES for Rate Schedule SCH-2 (FOR NON-MM PART)**

If the contractor fails to maintain the required progress of work as per time schedule (as in the tender document) or to complete the work and clear the site within the time prescribed by the contract, he shall, without prejudice to any other right or remedy of BHEL on account of such breach, be liable for payment as Liquidated Damage to BHEL @ 0.5 % of the contract price for each item excluding element of taxes & duties, per week or part thereof of the delay, subject to maximum of 10 % of total executed contract price excluding elements of taxes, duties etc.

### **3.2 LIQUIDATED DAMAGES for Rate Schedule SCH-1 (FOR MM PART)**

Since the contract is dependent on the arrival of materials at site, the liquidated damage/ compensation for delay will be charged if the consignment is not received & unloaded in time and BHEL incur/ pay any detention/ demurrage charges. The amount of liquidated damage/ compensation for delay will be limited to the amount of such charges BHEL incur/ pay plus (+) 5 % thereof in each case. The total ceiling for such liquidated damages/ compensation for delay shall be 10% of the total value of SI No 1 of SCH-1.

### **4.0 PAYMENT FOR WORK COMPLETED:**

- 4.1 The tenderer shall quote separate rates as required therein for each of the categories of work in the rate schedule.
- 4.2 The contractor shall submit his running bill once in a month at the end of each month. The R. A. Bill complete in all respect accompanied by BHEL engineers certificates/ measurement sheets jointly signed, will be paid only after ageing of more than 30 days from the date of invoice as submitted. The measurement will be taken as per clause of general conditions of contract and certified by BHEL Engineer for actual.

In addition to the monthly R.A.Bill, contractor has to submit two copies of tax invoice duly countersigned by the BHEL engineers.

Original invoice shall contain the following documents/ details:

- 1) **Along with the first invoice:**
  - a) Copy of valid registration certificate under the Service Tax rules.
  - b) Particulars required for making payments through 'Electronic Payment Mechanism', namely, name and address of the Bank

with branch details, type of bank account (SA/CA/CC), bank account number, RTGS/ NEFT code along with a cancelled cheque leaf.

- c) E-mail id of the contractors / their authorized persons.
- d) Temporary Contract License from the Ministry of Industry & Commerce, Royal Government of Bhutan and **T.P.N ( TAX PAYEE'S NUMBER ) from R.R.C.O.**, Royal Government of Bhutan.

**2) Periodical payment:**

- a) Invoice (i.e. Tax invoice as per relevant Service Tax rules, in original and duplicate, clearly indicating Service Tax registration number, Service Classification, Rate and amount of Service Tax shown separately).
- b) Details of statutory payments like EPF and ESI etc., (As applicable).
- d) Undertaking by the contractor regarding compliance of all statutes.

4.3 Subject to any deduction which BHEL may be authorized to make under the contract, the contractor shall on the certification of BHEL Engineer at site, be entitled to payment as explained hereunder.

5.0 Terms of Payment

5.1 25% of LS contract price in S.No.1 OF SCH-2 of rate schedule shall be paid on handing over of the lower pit liner of each unit for concreting along with embedment and pipes of the first stage as per following breakup:

- a) On assembly of lower Pit Liner on foundation: 40%
- b) Alignment, welding and NDT of pit liner joints: 20%
- c) Completion of balance works to hand over for concreting 20%
- d) Installation of embedment and pipes of 1<sup>st</sup> stage: 20%

5.2 The contract price in S.No.1 OF SCH-1 of the rate schedule shall be paid on prorated basis as per following breakup

- a) On unloading, stacking, verification 60%
- b) Installation/handling over to BHEL store 40%

**Note:** After completion of works, reconciliation of materials shall be done and balance materials in custody of the contractor shall be returned to BHEL store.

- 5.3 The contract price in S.No.2 of SCH-2 of the rate schedule shall be paid on prorata basis as per following breakup:
- |   |     |
|---|-----|
| a) Installation of Central Frame works        | 10% |
| b) Installation of Lower Turbine Housing      | 10% |
| c) Assembly of Distributor                    | 20% |
| d) Welding & NDT of Distributor               | 40% |
| e) Hydro Test of Distributor                  | 10% |
| f) Handing over of Distributor for concreting | 10% |
- 5.6 Out of the above progressive payment (RA bills), 5% will be retained from each RA Bill which will be released unit wise on completion of warranty period and final bill formalities i.e. (i) Jointly signed measurement for final bill, (ii) Jointly signed statement having cumulative joint measurement of the contract, (iii) Jointly signed material reconciliation statement, (iv) Signed statement of payment received from BHEL – Bill wise, (v) No claim certificate by the contractor, (vi) Clearance certificates, wherever applicable, (vii) Notarised indemnity Bond in prescribed format (viii) Any other requirement to be informed by BHEL's Construction Manager, for items 5.1 and 5.3 above. Retention money for 5.2 above shall be released along with release of the retention money for 5.1 and 5.3, which is released last, subject to material reconciliation, handing over of balance material and completion of final bill formalities as described above.

*However the above 5% payment (Clause 5.6) can be released on the date of commencement of guarantee against the Bank Guarantee in the prescribed format for the equivalent amount valid till end of the Warranty Period of the last item (extendable as per instruction of BHEL), subject to be receipt of certificate that all works and final bill formalities as described above, are completed.*

The submission of Bank Guarantee towards above is separate and the bank guarantee towards security deposit cannot be utilized for this purpose. The security deposit will be refunded as per certificate of site on completion of final bill formalities as per relevant clauses of GCC.

**NOTE:**

1. No levy or payment or charge made or imposed shall be impeached by reason of any clerical error or demanded or charged.
2. BHEL/Mangdechhu Site at its discretion may further split up the above percentage and effect payment to suit the site

conditions, cash flow requirement, according to the progress of work.

## 6.0 TAXES AND DUTIES

- 6.1 All taxes, charges, royalties, duties, octroi etc and other taxes in **India and / or Bhutan** for materials obtained for the work and for the execution of the contract shall be borne by you and shall not be payable extra, except Indian Service Tax and applicable Educational Cess. Any increase of the rate of the existing taxes or imposition of any new tax at any stage during execution of the contract shall have to be borne by you. Accepted rates / price of shall be inclusive of all such requirements.

The contractor shall have to make their own arrangement at their cost for completing the formalities, if required, with the Customs/ Statutory authorities in India or in Bhutan, for bringing their materials, plants and machinery at site.

Vide Public Notification no: DRC/TAX-A&L/RA/15/2410 dated March , 11, 2011 , issued by Royal Government of Bhutan , Ministry of Finance , Tax shall be deducted from Contractors under limited Tax Liability for Construction , logging work , transportation , management Contracts , Consultancy including other professional Services and Supplies .The Tax shall be deducted at the rate of 3% on the Gross Amount and shall be treated as Final u/s. 18.20 , chapter 3, General Provisions of Income Tax Act , 2001 **Rate of TDS under Full Tax Liability-FOR BHUTAN BIDDER, Contract Income : 2% of the gross amount**

*Rate of TDS of Income Tax as prevalent in India/ Bhutan, as the case may be, on the date of passing of the Bill shall be applicable.*

The bidder is required to comply with these laws/acts and other relevant provisions particularly with reference to the taxes and duties and Indian Bidder must obtain Temporary Contract License from the Ministry of Industry & Commerce as also obtain **T.P.N ( TAX PAYEE'S NUMBER ) from R.R.C.O.** BHEL shall not be held responsible for non-compliance of any laws/acts in Bhutan.

The Royal Govt, of Bhutan (R.G.O.B) shall receive from the Contractor royalty for the timber, boulders, aggregates and other Construction materials required from Bhutan for the Project.

- 6.2 SERVICE TAX : Applicable for Indian Bidder only .

The subject service is "works contract" as per Sec. 65B (54) of the Finance Act, 1994. Service Tax along with Educational Cess as legally leviable & payable by the successful bidder under Sec-65B (44), shall be paid by BHEL on production of GA R-7 challan. In case Service Tax is payable by BHEL under reverse charge mechanism, vide Notification no 30/2012 - Service Tax, dated 20-06-2012, shall be paid separately.

The Bidder shall issue invoice complying with Rule 4A of the Service Tax Rules 1994. The invoice shall indicate the name, address and the registration number (PAN Based STC No.) of the Bidder; the name and address and the registration number(\_AAACB4146PST005) of BHEL.; the description and value of taxable service provided; and the service tax payable thereon by the Bidder. Copy of the same enclosed for ready reference

You shall furnish proof of Service Tax Registration (ST-2) with Central Excise Division covering the Services . Registration should also bear endorsement for the premises from where the billing shall be done by you on BHEL for this Project.

BHEL will not be held to be responsible for non-compliance of various Service Tax Rules, being framed from time to time.

The term "**Total amount**" means the sum total of the gross amount charged for the works contract and the fair market value of all goods and services supplied in or in relation to the execution of the works contract, whether or not supplied under the same contract or any other contract, after deducting-

- (i) the amount charged for such goods or services, if any; and
- (ii) the value added tax or sales tax, if any, levied thereon

New tax & duties, if imposed subsequent to latest due date of offer submission, as per NIT & TCN, as applicable, by statutory authority after due date of submission of latest price offer and within the contract period including extension, if any (provided reason for extension is not attributable to you), shall be reimbursed by BHEL at actual on production of relevant supporting document to the satisfaction of BHEL. However, you shall obtain prior approval from BHEL before depositing new taxes & duties.

## **7.0 OVER RUN COMPENSATION (ORC)/ PRICE VARIATION (PVC)/ RATE REVISION**

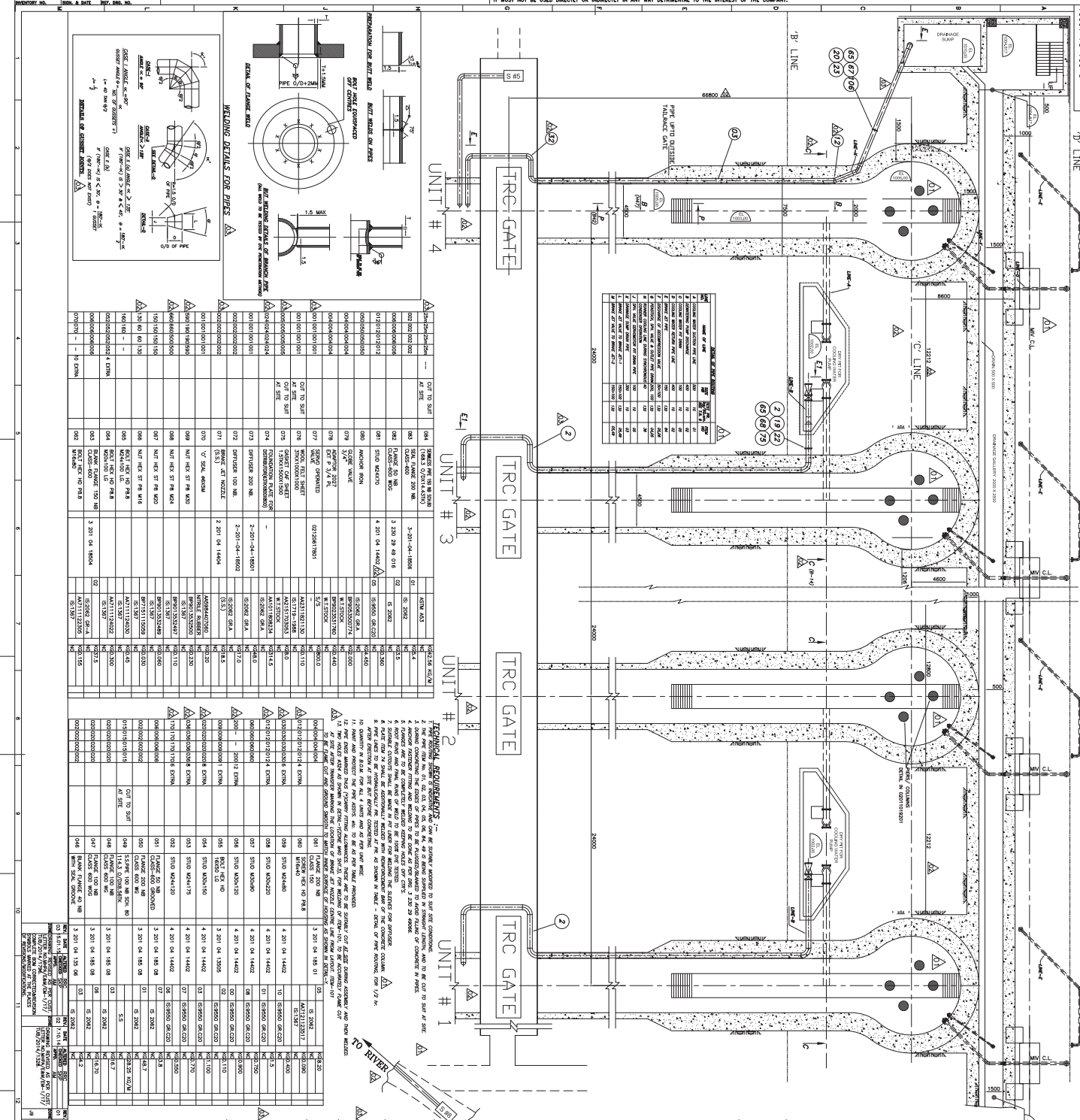
PVC/ ORC/ Rate Revision are not applicable for this contract.

## **8.0 WEIGHT VARIATION FOR SCH-2 OF RATE SCHEDULE**

The items/components indicated in the tender is indicative and may vary to any extent. No compensation shall be payable in case of any variation in the items/components listed in the bill of quantities listed at relevant annexure of the Tender Specification & Special Conditions Of Contract ,Vol-1F. However, in case of deletion of any item or addition of new items over and above the items listed at relevant annexure of the ,Vol-1F, adjustment (i.e. payment or recovery as the case may be ) shall be done on prorata basis based on the Rate per MT worked out from the quoted Lumpsum Price and the total weight of components listed in relevant annexure of the Tender Specification & Special Conditions Of Contract,Vol-1F plus 15% weight variation limit.



10261 10 102 0 101 300  
 FIRST ANGLE PROJECTION  
 (ALL DIMENSIONS ARE IN MM)



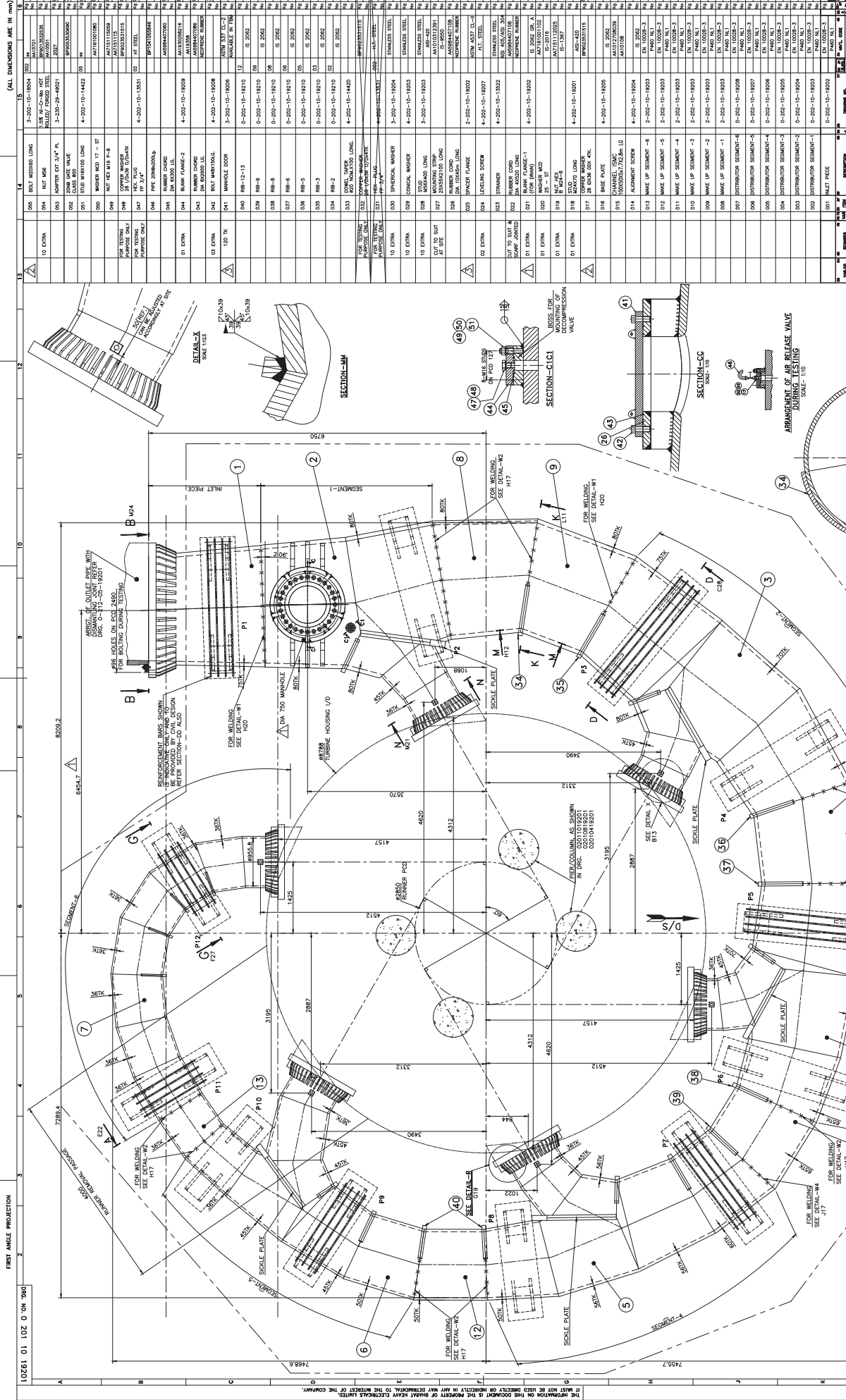
NO.	DESCRIPTION	QTY	UNIT	REMARKS
001	CUT TO START	1	M	
002	CONCRETE	1	M	
003	STEEL	1	M	
004	WOOD	1	M	
005	BRICK	1	M	
006	PLASTER	1	M	
007	PAINT	1	M	
008	REINFORCEMENT	1	M	
009	FORMWORK	1	M	
010	LABOUR	1	M	
011	CONCRETE	1	M	
012	STEEL	1	M	
013	WOOD	1	M	
014	BRICK	1	M	
015	PLASTER	1	M	
016	PAINT	1	M	
017	REINFORCEMENT	1	M	
018	FORMWORK	1	M	
019	LABOUR	1	M	
020	CONCRETE	1	M	
021	STEEL	1	M	
022	WOOD	1	M	
023	BRICK	1	M	
024	PLASTER	1	M	
025	PAINT	1	M	
026	REINFORCEMENT	1	M	
027	FORMWORK	1	M	
028	LABOUR	1	M	
029	CONCRETE	1	M	
030	STEEL	1	M	
031	WOOD	1	M	
032	BRICK	1	M	
033	PLASTER	1	M	
034	PAINT	1	M	
035	REINFORCEMENT	1	M	
036	FORMWORK	1	M	
037	LABOUR	1	M	
038	CONCRETE	1	M	
039	STEEL	1	M	
040	WOOD	1	M	
041	BRICK	1	M	
042	PLASTER	1	M	
043	PAINT	1	M	
044	REINFORCEMENT	1	M	
045	FORMWORK	1	M	
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050	BRICK	1	M	
051	PLASTER	1	M	
052	PAINT	1	M	
053	REINFORCEMENT	1	M	
054	FORMWORK	1	M	
055	LABOUR	1	M	
056	CONCRETE	1	M	
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063	FORMWORK	1	M	
064	LABOUR	1	M	
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066	STEEL	1	M	
067	WOOD	1	M	
068	BRICK	1	M	
069	PLASTER	1	M	
070	PAINT	1	M	
071	REINFORCEMENT	1	M	
072	FORMWORK	1	M	
073	LABOUR	1	M	
074	CONCRETE	1	M	
075	STEEL	1	M	
076	WOOD	1	M	
077	BRICK	1	M	
078	PLASTER	1	M	
079	PAINT	1	M	
080	REINFORCEMENT	1	M	
081	FORMWORK	1	M	
082	LABOUR	1	M	
083	CONCRETE	1	M	
084	STEEL	1	M	
085	WOOD	1	M	
086	BRICK	1	M	
087	PLASTER	1	M	
088	PAINT	1	M	
089	REINFORCEMENT	1	M	
090	FORMWORK	1	M	
091	LABOUR	1	M	
092	CONCRETE	1	M	
093	STEEL	1	M	
094	WOOD	1	M	
095	BRICK	1	M	
096	PLASTER	1	M	
097	PAINT	1	M	
098	REINFORCEMENT	1	M	
099	FORMWORK	1	M	
100	LABOUR	1	M	











NO.	DESCRIPTION	QTY	UNIT	REMARKS
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99	EXTRA			
100	EXTRA			

45180 MW MANGDORCHU DEP  
 MHPA, BHUTAN  
 NHEPC LIMITED  
 (A CORPORATION OF INDIA) (NHEPC)  
 BHARAT HEAVY ELECTRICALS LTD.  
 BHOPAL  
 SCALE: 1:25 (FOR 1:1000)  
 DATE: 10/10/2021  
 DRAWING NO.: 0202 10 192 01 03  
 PROJECT: ARGENT/INSTALLATION OF

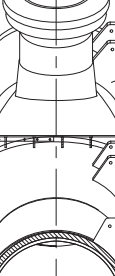
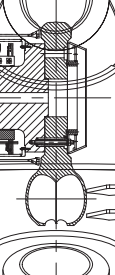
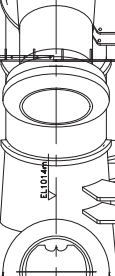
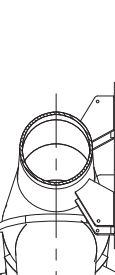
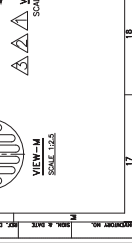
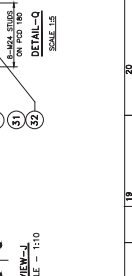
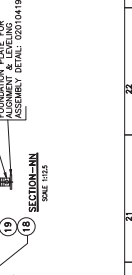
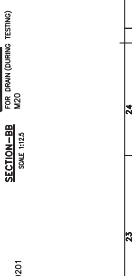
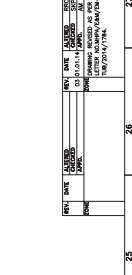
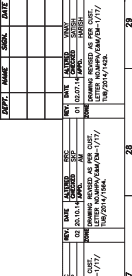
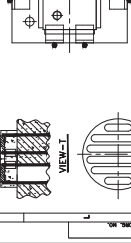
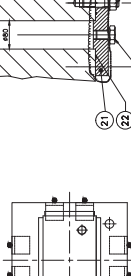
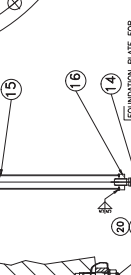
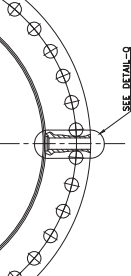
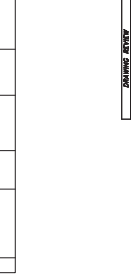
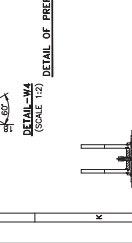
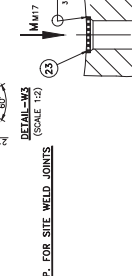
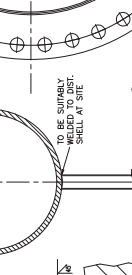
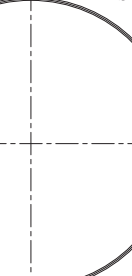
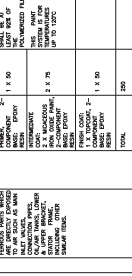
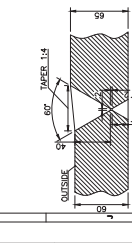
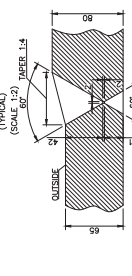
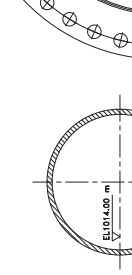
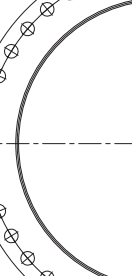
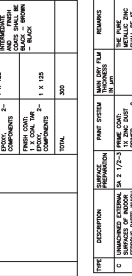
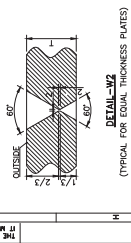
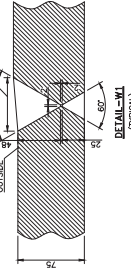
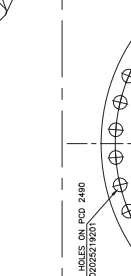
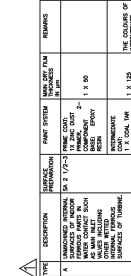
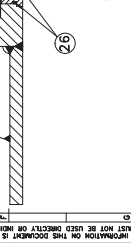
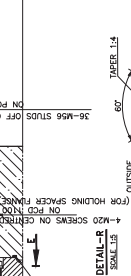
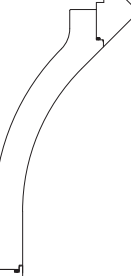
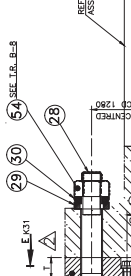
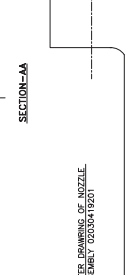
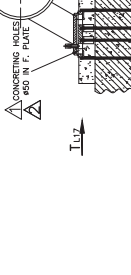
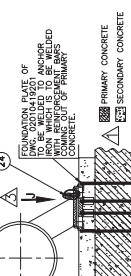
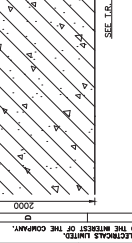
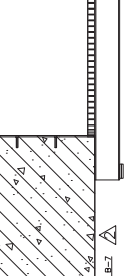
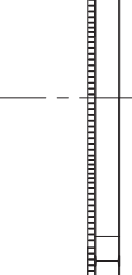
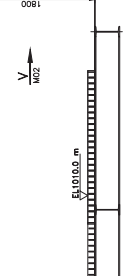
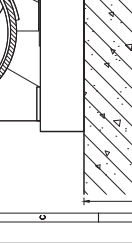
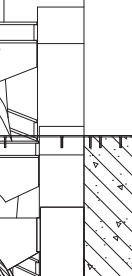
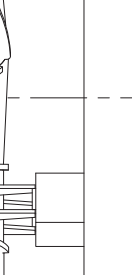
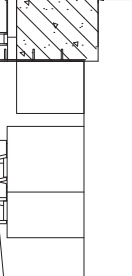
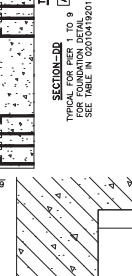
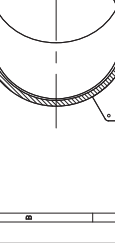
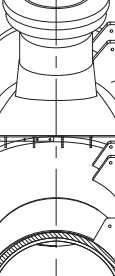
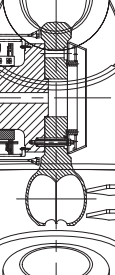
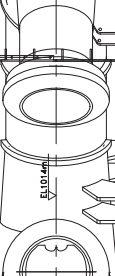
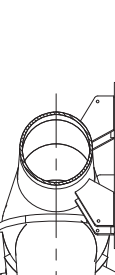
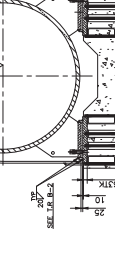
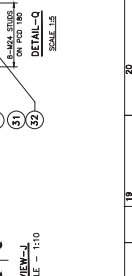
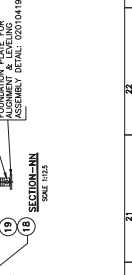
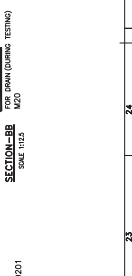
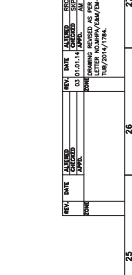
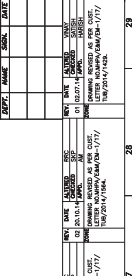
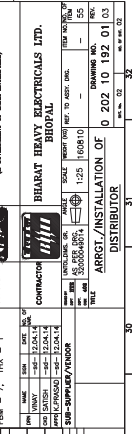
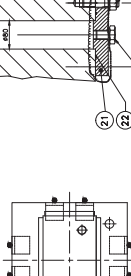
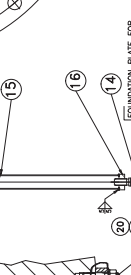
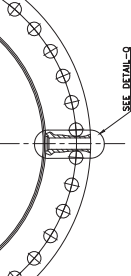
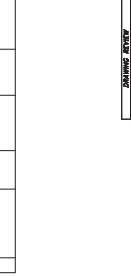
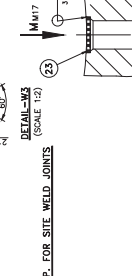
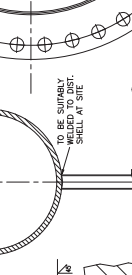
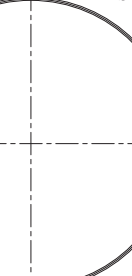
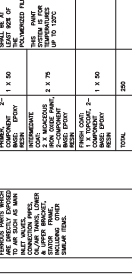
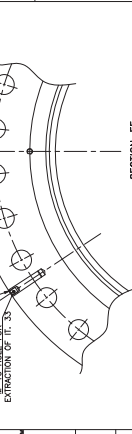
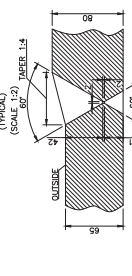
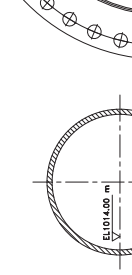
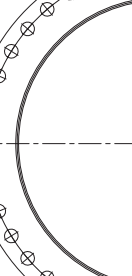
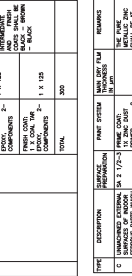
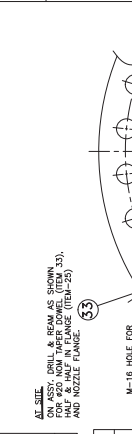
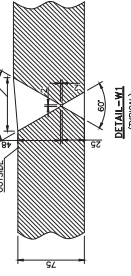
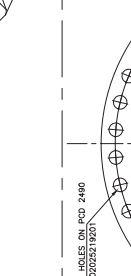
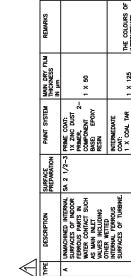
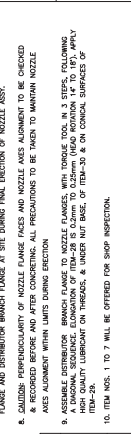
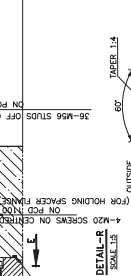
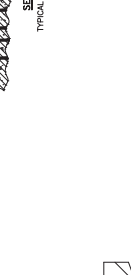
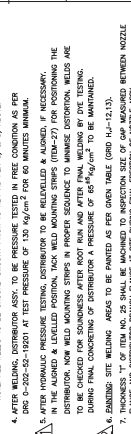
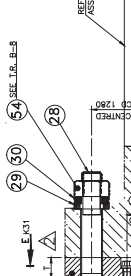
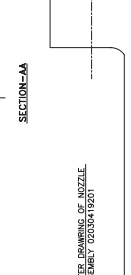
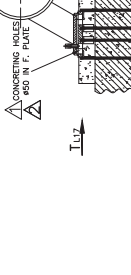
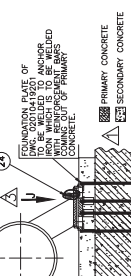
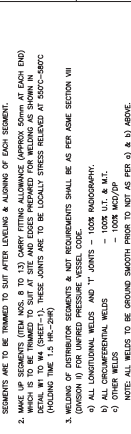
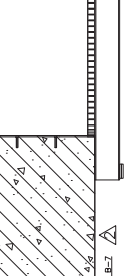
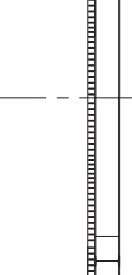
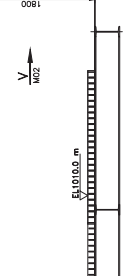
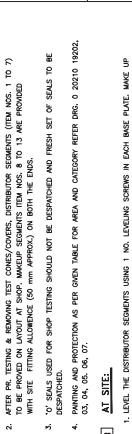
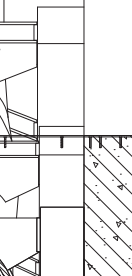
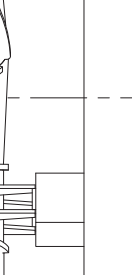
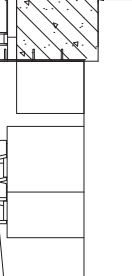
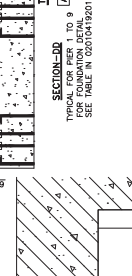
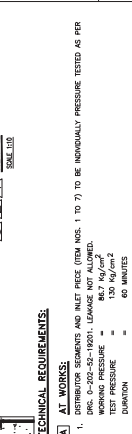
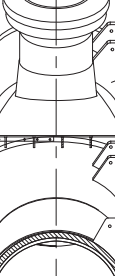
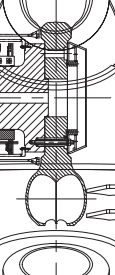
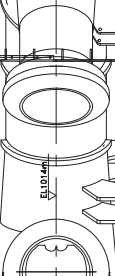
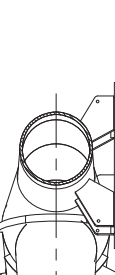
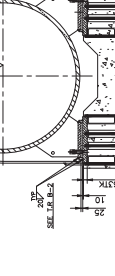
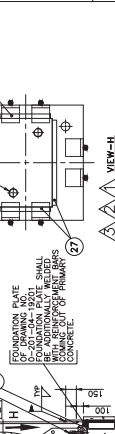
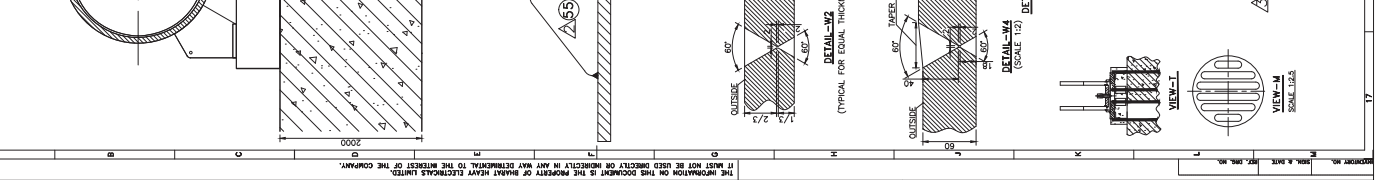
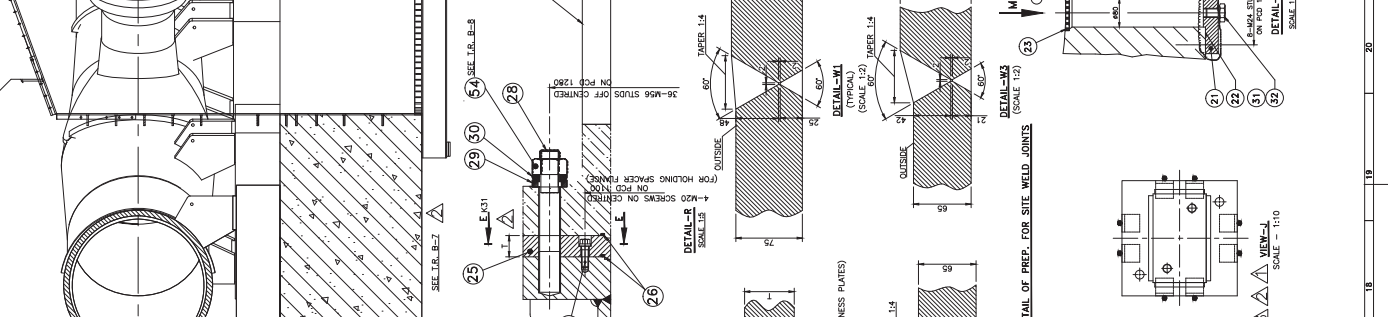
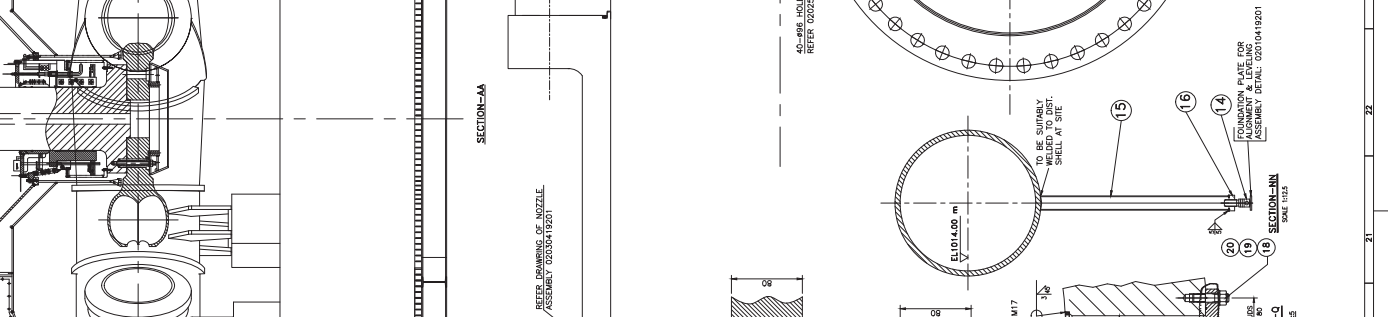
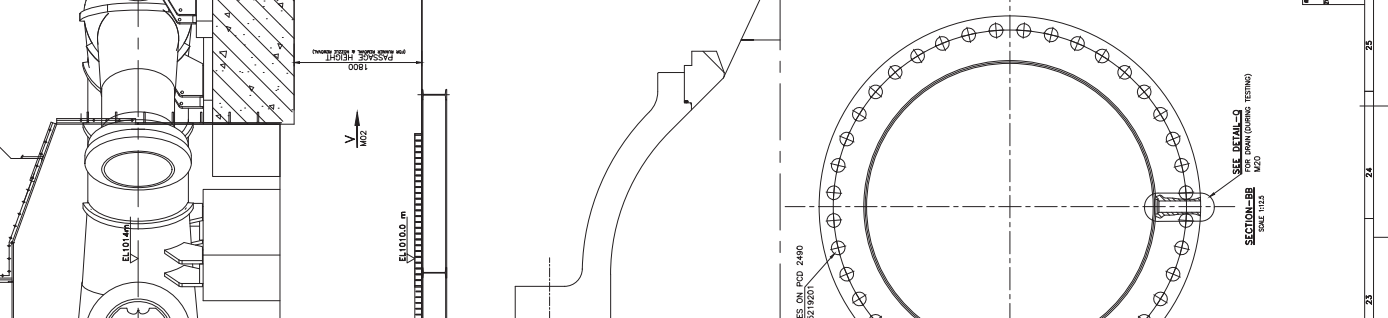
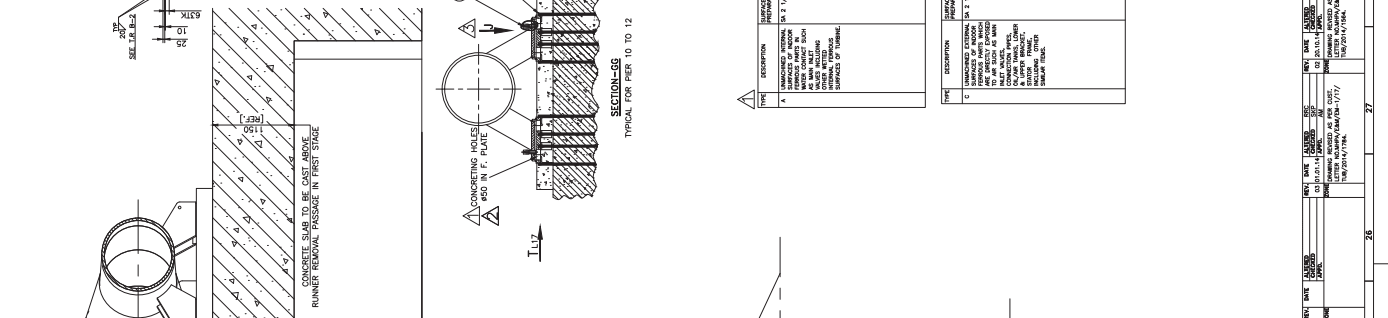
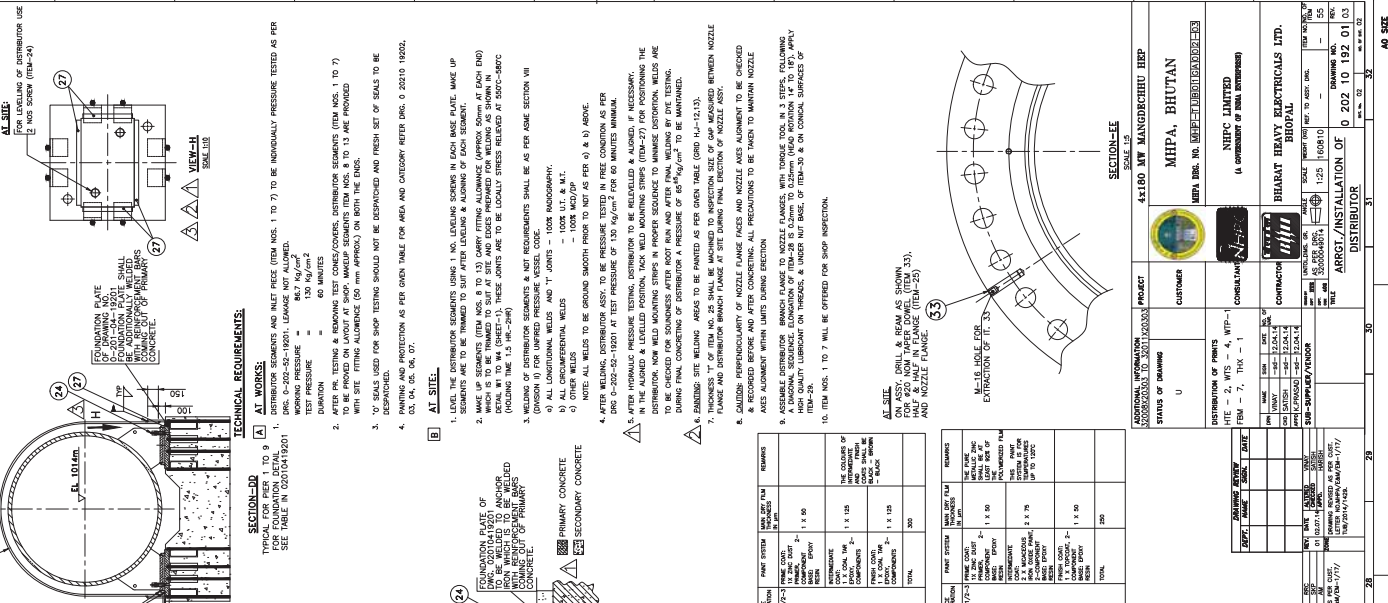
ALL DIMENSIONS ARE IN (mm)  
 FIRST ANGLE PROJECTION  
 REFERENCE DRAWINGS:  
 1) PIPES & FITTINGS IN FREE STATE  
 2) PIPES & FITTINGS IN FREE STATE FOUNDATION  
 3) ARRANGEMENT OF LUGS FOR LIFTING  
 4) ARRANGEMENT OF LUGS FOR LIFTING  
 5) TENSILE JACKS AND EXHAUST JACKS  
 6) TENSILE JACKS FOR LIFTING  
 7) TENSILE JACKS FOR LIFTING  
 8) TENSILE JACKS FOR LIFTING  
 9) TENSILE JACKS FOR LIFTING  
 10) TENSILE JACKS FOR LIFTING  
 11) ARRANGEMENT OF OUTLET PIPE WITH DEBANDING JOINT

REINFORCEMENT BARS SHOWN ARE TO BE PROVIDED BY CIVIL DESIGN

ALL DIMENSIONS ARE IN (mm)

FIRST ANGLE PROJECTION

10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40 41 42 43 44 45 46 47 48 49 50 51 52 53 54 55 56 57 58 59 60 61 62 63 64 65 66 67 68 69 70 71 72 73 74 75 76 77 78 79 80 81 82 83 84 85 86 87 88 89 90 91 92 93 94 95 96 97 98 99 100

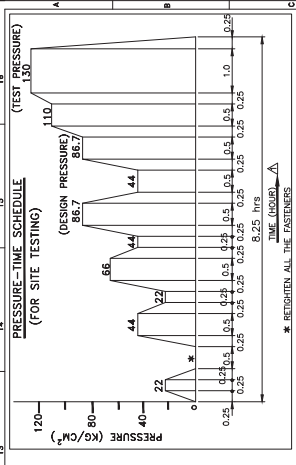




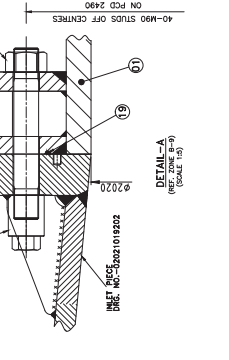
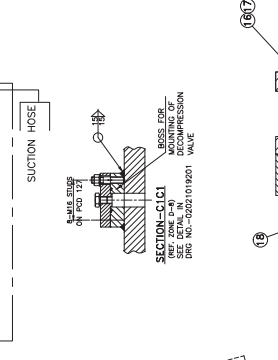
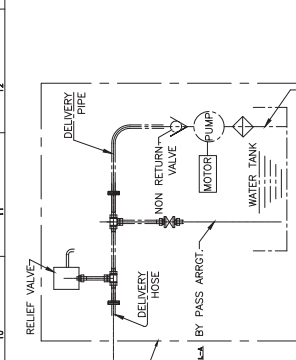




1:0261, E5, 202, 0, 3M, 3000



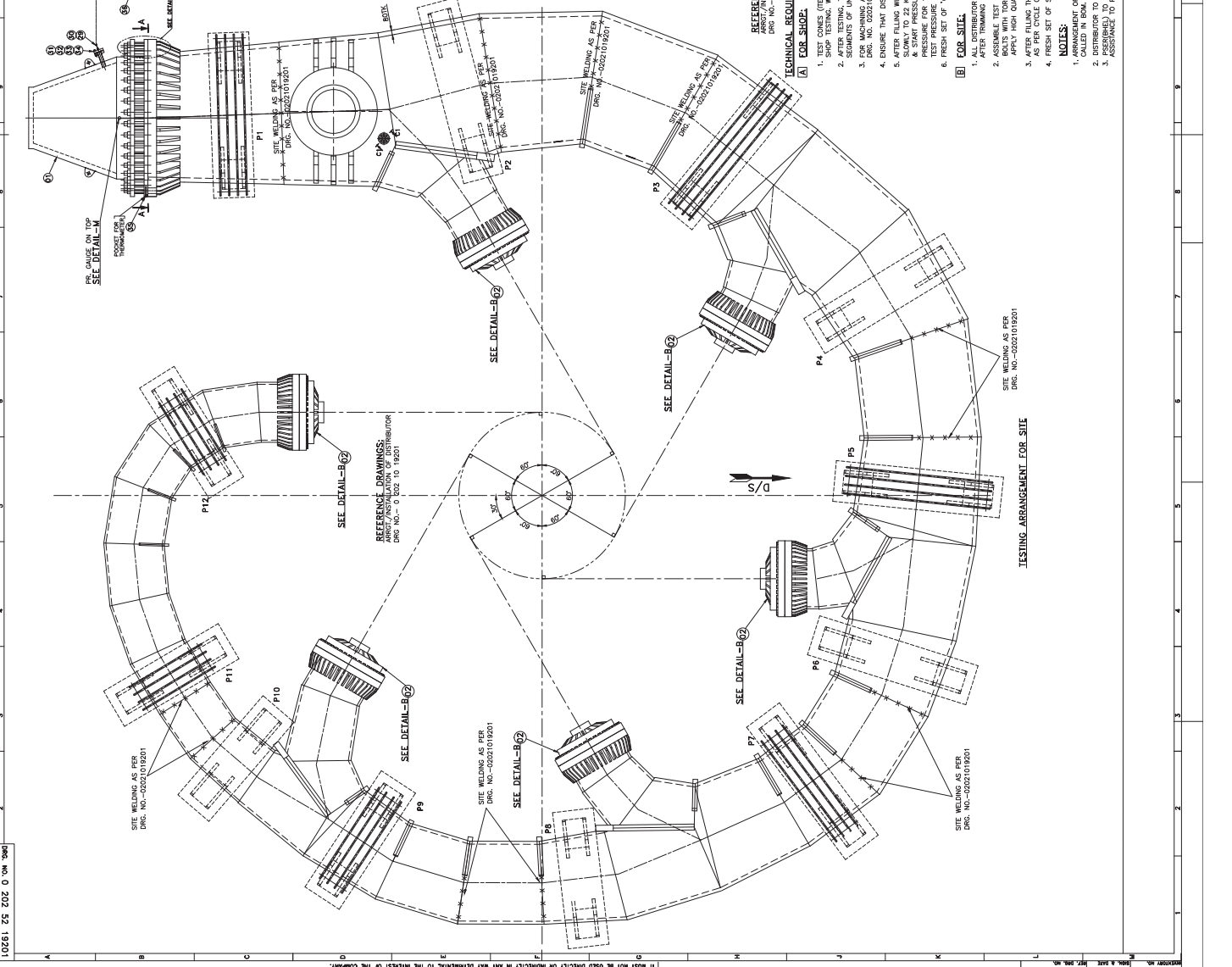
NO.	DESCRIPTION	DATE	BY	CHECKED	APPROVED
1000	FOR SITE	10/01/2021	...	...	...
1001	FOR SITE	10/01/2021	...	...	...
1002	FOR SITE	10/01/2021	...	...	...
1003	FOR SITE	10/01/2021	...	...	...
1004	FOR SITE	10/01/2021	...	...	...
1005	FOR SITE	10/01/2021	...	...	...
1006	FOR SITE	10/01/2021	...	...	...
1007	FOR SITE	10/01/2021	...	...	...
1008	FOR SITE	10/01/2021	...	...	...
1009	FOR SITE	10/01/2021	...	...	...
1010	FOR SITE	10/01/2021	...	...	...
1011	FOR SITE	10/01/2021	...	...	...
1012	FOR SITE	10/01/2021	...	...	...
1013	FOR SITE	10/01/2021	...	...	...
1014	FOR SITE	10/01/2021	...	...	...
1015	FOR SITE	10/01/2021	...	...	...
1016	FOR SITE	10/01/2021	...	...	...
1017	FOR SITE	10/01/2021	...	...	...
1018	FOR SITE	10/01/2021	...	...	...
1019	FOR SITE	10/01/2021	...	...	...
1020	FOR SITE	10/01/2021	...	...	...
1021	FOR SITE	10/01/2021	...	...	...
1022	FOR SITE	10/01/2021	...	...	...
1023	FOR SITE	10/01/2021	...	...	...
1024	FOR SITE	10/01/2021	...	...	...
1025	FOR SITE	10/01/2021	...	...	...
1026	FOR SITE	10/01/2021	...	...	...
1027	FOR SITE	10/01/2021	...	...	...
1028	FOR SITE	10/01/2021	...	...	...
1029	FOR SITE	10/01/2021	...	...	...
1030	FOR SITE	10/01/2021	...	...	...
1031	FOR SITE	10/01/2021	...	...	...
1032	FOR SITE	10/01/2021	...	...	...
1033	FOR SITE	10/01/2021	...	...	...
1034	FOR SITE	10/01/2021	...	...	...
1035	FOR SITE	10/01/2021	...	...	...
1036	FOR SITE	10/01/2021	...	...	...
1037	FOR SITE	10/01/2021	...	...	...
1038	FOR SITE	10/01/2021	...	...	...
1039	FOR SITE	10/01/2021	...	...	...
1040	FOR SITE	10/01/2021	...	...	...



DESIGN PRESSURE	TEST PRESSURE	DURATION OF PR. TEST FOR COMPLETE DISTRIBUTOR (AT 8.25 HOURS)
88.7 Kg/cm²	130 Kg/cm²	8.25 HOURS

- TECHNICAL REQUIREMENTS:**
- TEST CHAMBERS (FROM NOS. 3 TO 10) TO BE WELDED WITH RESPECTIVE DISTRIBUTOR SEGMENTS FOR SHOP TESTING. WELDING TO BE GRADE 1 WITH TORQUE U.T. TO BEHOLD. AS 0202/01.
  - AFTER TESTING, TEST CHAMBERS TO BE CUT & EDGE PREP TO BE MADE FOR WELDING WITH DISTRIBUTOR SEGMENTS OF UNITS 2 TO 4. IN DESIGN 50 mm MATERIAL HAS BEEN PROVIDED FOR EACH CUTTING. DRG. NO. 0203/01/2021.
  - ENSURE THAT DISTRIBUTOR SEGMENTS ARE THOROUGHLY CLEANED ON ENDS OF DISTRIBUTOR SEGMENTS REFER DRG. NO. 0203/01/2021.
  - AFTER FILLING WITH WATER, CLOSE THE AIR INLET AND START PRESSURING. PRESSURE TO BE RASING SLOWLY TO 22 Kg/cm² & MAINTAIN FOR 10 MINUTES AND RELEASE THE PRESSURE. RETIGHTEN BOLTS PRESSURE FOR 10 MINUTES AT EACH INTERMEDIATE STEP. HOWEVER TEST DURATION FOR EACH SEGMENT AT TEST PRESSURE SHALL BE 60 MINUTES. NO LEAKAGE IS ALLOWED FROM ANY WELD / FLANGE JOINT.
  - FRESH SET OF 'O' SEALS SHALL BE USED FOR EACH TEST.

- FOR SITE:**
- ALL DISTRIBUTOR SEGMENTS ARE TO BE FULLY ASSEMBLED AND WELDED AS PER DRG. 0202/01/2021.
  - PERFORM TESTS IN SITE. TEST CHAMBERS TO BE TESTED IN THE FOLLOWING SEQUENCE: 1. TEST CHAMBER INLET FLANGE AND TIGHTEN BOLTS WITH TORQUE TOOL. IN 3 STEPS FOLLOWING A DIAGONAL SEQUENCE. APPLY HIGH QUALITY LUBRICANT ON THREAD AND NUT CONTACT SURFACES.
  - AFTER FILLING THE DISTRIBUTOR AND AIR RELEASE, START PRESSURING AND FOLLOW THE PROCEDURE DESCRIBED IN TECHNICAL REQUIREMENTS.
  - FRESH SET OF SEALS TO BE USED FOR TESTING OF EACH UNIT.
- NOTES:**
- ARRANGEMENT OF TESTING IS COMMON FOR ALL 4 UNITS. 'O' SEALS FOR TESTING OF ALL UNITS ARE CALLED IN BOM.
  - DISTRIBUTOR TO BE TESTED IN FREE STANDING CONDITION.
  - ASSURANCE TO BE PROVIDED IN THIS REGARD.



THE DISTRIBUTION HAS BEEN MADE IN THE PRESENCE OF BHARAT HEAVY ELECTRICALS LIMITED. IT MUST NOT BE USED DIRECTLY OR INDIRECTLY IN ANY MANNER WITHOUT THE PERMISSION OF THE COMPANY.



**ANNEXURE-1**  
**DETAILS OF ITEMS TO BE INSTALLED PER UNIT**  
**TENDER NO :PSER:SCT:MDC-H1676:15**

S.No.	Description	Item No. in drg.	Weight in Kg
1	CW pipe (500 NB ,7 mtr)	1 ( At EL 1003.75)	1085
2	CW pipe (500 NB ,7 mtr)	1 ( At EL 1005.75)	1085
3	Penstock drain /decompression valve pipe (200 NB,16 MTR)	4 (At EL 1008.16)	1216
4	Penstock drain /decompression valve pipe (100 NB,16 MTR)	5 (At EL 1008.16)	480
5	Penstock drain /decompression valve pipe (50 NB,16 MTR)	6 (At EL 1008.16)	192
6	Support /Angle /Channels etc. for S.No. 1 to 5		1200
7	Pit Liner segment-1		4600
8	Pit Liner segment-2		4500
9	Pit Liner segment-3		4500
10	Pit Liner segment-4		4600
11	Foundation plate/Anchor hook/Anchor lug/turn buckle etc.		3500
12	100 NB Diffuser (Item No. 72)at EL 1008.16		20
13	200 NB Diffuser (Item No. 73)at EL 1008.16		50

Note: Total weight of materials to be erected per unit is 30MT approx.

- Ref Drgs: 1. 02010419201-03-01-03  
2. 02010419201-03-02-03  
3. 02010419201-03-03-03  
4. 02011019201-04-01-02

**ANNEXURE-2**  
**DETAILS OF ITEMS TO BE INSTALLED for DISTRIBUTOR ASSEMBLY & TESTING**  
**TENDER NO :PSER:SCT:MDC-H1676:15**

S.No.	Description	Item No. in dfg.	Weight in Kg
1	Turbine Lower housing in six segments & associated parts	1 to 6	33292
2	Central Frame Work & associated parts		15198
3	Distributor & associated parts		159925

Note: Total weight of materials to be erected is 210 MT approx.

- Ref Drgs: 1. 0-201-08-19201 'Arrangement of Central frame'  
2. 0-202-10-19201 'Arrangement & Installation of Distributor'  
3. 0-202-11-19201 'Installation of Turbine Housing'  
4. 0-202-52-19201 'Testing devices for Distributor'