



**TENDER DOCUMENT
For Works Contract
For Tender Enquiry No : FCX/TW/09/03**

**For
Civil and allied work under debottlenecking scheme for Power Transformer
Manufacturing.**

Contact Person :

Name : Anshuman Sharma
Designation : Dy. Mgr (MM)
Email : anshuman.sharma@bhel.in
PH : 0510 – 241 – 2784

**Tender Due Date 01/11/2019 at 13 :15 Hrs
Tender Opening Date : 01/11/2019 at 14 :00 Hrs**

**Material Management Department
BHEL, PO : BHEL, Jhansi 284120 (UP)**

Detail of Bidder and Documents to be submitted along with Technical Bid

Please number your documents in continuation with tender documents at bottom (footer) of page.

S.No.	Particular	Detail
1.	Name of the firm	
2.	Name of the Proprietor/Partners	
3.	Address	
4.	Mobile No.	
5.	E-mail ID	

Essential Documents

	Particular	Detail	Page No
6.	Acceptance of Terms & conditions Signature on all pages without conditions of contractor	Submitted/ Not submitted	
7.	Blank price bid format duly signed by the contractor.	Submitted/ Not submitted	
8.	Copy of ESI Registration	ESI No-	
9.	Copy of PAN card	PAN No-	
10.	Copy of GST registration	GST No-	
11.	Self declaration as per as per annexure V on Rs 100 stamp paper .	Submitted/ Not submitted	
12.	Copy of ownership of firm	Submitted/ Not submitted	
13.	Receipt of tender fees deposition	Amount	
14.	Receipt of EMD deposition	Amount	
15.	Copy of turn over for last three year i. FY 2016-17 ii. FY 2017-18 iii. FY 2018-19	Submitted/ Not submitted	

BHARAT HEAVY ELECTRICALS LIMITED, JHANSI**Factory Civil Department****TENDER DOCUMENT****TENDER ENQUIRY NO. FCX/TW/09/03****DATE:- 10/10/2019**

16.	Work Experience i. Work order ii. Completion Certificte iii. Bill of Quantity Relevant TDS/TRACES (in case of Experience in private sector)	Submitted/ Not submitted	
17.	Copy of IncomTax return (Last three FY) i. 2016-17 ii. 2017-18 iii. 2018-19	Submitted/ Not submitted	
18.	Copy of PF registration	PF No-	

We will fulfill all the obligations of the contractor and abide by the terms & Conditions mentioned in the enquiry.

Date :-

Signature With Name & Seal

BHARAT HEAVY ELECTRICALS LIMITED, JHANSI**Factory Civil Department****TENDER DOCUMENT****TENDER ENQUIRY NO. FCX/TW/09/03****DATE:- 10/10/2019****TABLE OF CONTENTS****PART I: TECHNO-COMMERCIAL BID**

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PART II: PRICE BID**(Separate envelope)**

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BHARAT HEAVY ELECTRICALS LIMITED, JHANSI
Factory Civil Department
TENDER DOCUMENT

TENDER ENQUIRY NO. FCX/TW/09/03

DATE:- 10/10/2019

NOTICE INVITING TENDER



Factory Civil Department**TENDER DOCUMENT****TENDER ENQUIRY NO. FCX/TW/09/03****DATE:- 10/10/2019****1- NOTICE INVITING TENDER**

S. No.	Particulars	Details
1	Name of work	Civil and allied work under debottlenecking scheme for Power Transformer Manufacturing
3	Tender Evaluation Criteria	(As per GTC issued by "Central Contracting Cell" and Special condition of contract for Civil Work of BHEL Jhansi.
4	Duration of the Contract	Twenty Monts (20 months)
5	Last date of receipt of the Tender	(As on page # 1)
6	Date of opening Tender	(As on page # 1)
7	Address for submitting the tender	(As on page # 7)
8	Earnest Money Deposit (EMD)	Rs. 1, 69,823/- (Rupees One Lakhs Sixty Nine Thousand Eight Hundred Twenty Three only)
9	Cost of tender (Non refundable)	Rs. 1500.00 plus (18% GST as payable at BHEL cash office through POS machine or RTGS/NEFT/IMPS/EFT/ECS in BHEL account mentioned below)
10	Validity of Offer	120 days
11	Defect liability period	One year from actual date of completion

Note: The EMD may be accepted only in the following forms:

(i) Electronic Fund Transfer credited in BHEL account (before tender opening)

BHEL account details: Bank Name: - SBI; A/c No.: 10670828866 ; IFSC Code:- SBIN0003807 A/c Holder

Name:- BHARAT HEAVY ELECTRICALS LIMITED

(ii) At BHEL cash office through POS machine **No Demand Drafts shall be accepted.**

The contractors may physically visit the work place before quoting their rates. For relevant details, please visit our website "www.bhel.com" & "www.bheljhs.co.in"

Note: BHEL takes no responsibility for any delay / loss of documents or correspondence sent by courier or post. Late tenders shall be rejected outright.

The techno-commercial bid comprising (i) all its sections, (ii) all enclosures in support of various clauses and requirements and (iii) EMD, shall be duly signed and sent in a sealed envelope boldly super-scribing

"PART-I TECHNO COMMERCIAL BID FOR "Civil and allied work under debottlenecking scheme for Power Transformer Manufacturing " . Similarly, the Price-bid must be duly signed and sent in a sealed envelope boldly super-scribing **"PART-II PRICE BID FOR "Civil and allied work under debottlenecking scheme for Power Transformer Manufacturing**.

Both these envelopes shall be placed inside 3rd sealed envelope super-scribing **"Civil and allied work under debottlenecking scheme for Power Transformer Manufacturing "** duly signed and sent in a sealed envelope boldly super-scribing **"Civil and allied work under debottlenecking scheme for Power Transformer Manufacturing "**.

The tender shall be addressed to as follows:

We hereby accepted above (Signature & seal of bidder)

BHARAT HEAVY ELECTRICALS LIMITED, JHANSI

Factory Civil Department

TENDER DOCUMENT

TENDER ENQUIRY NO. FCX/TW/09/03

DATE:- 10/10/2019

Anshuman Sharma

Dy. Mgr (MM)

Email : anshuman.sharma@bhel.in

PH : 0510 – 241 – 2784

Sealed Tenders can be submitted (i) personally, (ii) by Courier, or (iii) by post.

If submitted personally

Tender Box
CISF Control Room/Office
Administrative Building
Bharat Heavy Electricals Limited
Jhansi-284120 (U P)

Or if sent through Courier / Post

Office of
Anshuman Sharma
Dy. Mgr (MM)
Material Management Department
Email : anshuman.sharma@bhel.in
BHEL, JHANSI - 284120
PH : 0510 – 241 – 2784

Part-I Techno Commercial bid:

Part I of the sealed tenders alone will be opened by BHEL in the presence of tenderers who are present at the time & place of opening. A signed blank price-bid copy should be enclosed with this bid. The spaces for prices should be crossed (x).

Part-II Price bid:

The price bid should contain prices only. Price bid will be opened only for the parties who qualify in techno commercial bid.

TO BE SIGNED BY THE TENDERER

Certified that all Sections of the Tender have been read / complied & agreed to, and each page of the tender offer has been signed & stamped.

(Signature of Authorized person(s))

We hereby accepted above (Signature & seal of bidder)

Brief Description of Work / Scope of work

The project/ work site is located inside BHEL Jhansi factory. BHEL Jhansi approximately 15 km from Jhansi railway station at Jhansi Lalitpur Highway. The bidder are advised to take into account all factor and any fluctuation in the market rates etc. having effect in the prices. It is advised to contractor before submission of tender proper assessment of site and working conditions may be done. The work shall be carried out in and around production shops, and the site will be available for working as per time schedule mention in contract / final time schedule as decided by BHEL before start of work without disturbing the ongoing production activities. The work will be carried out at Bay 9 (Main Transformer assembly shop) and nearby area.

The scope of work shall be including but not be limited to the following:

1. Demolishing of RCC structure.
2. Dismantling of structural steel in railings, partitions, doors, windows, base plates, barricades, roofing, walls etc.
3. Civil and allied work for Storage Shop Production related Items (SPC), Office Building, Waste Oil Tanks, Shed for Compressor, Shed for VPD Plant, Shed for Static Frequency Converter, RCC Platform for Material Storage and area development for garbage disposal. This work shall include excavation of good earth, ordinary rock or hard rock as per the site conditions. Laying of PCC and further RCC as per the drawings.
4. Brickwork upto plinth and in wall as required.
5. Plastering of wall, painting of wall with approved color and shade including putty wherever required.
6. Aluminum work is to be carried out in office building as per the requirement.
7. Plumbing work in toilet in office building is to be carried out as per item description.
8. Paver block work is to be carried out over stone dust.
9. RCC post and GI barbed wire is to be laid as per requirement.
10. Water proofing of the office building is to be carried out with APP membrane.
11. Structural steel work including fabrication and erection is to be carried out for various sheds along with the priming and coloring of the fabricated structure.
12. Sheeting work along with fixing of ridges, flashing, capings etc. is to be carried out as per the drawing.

The above list is indicative and not exhaustive and shall include any other work not mentioned above but becomes important for successful completion of the entire work.

Note: It is also advised that the bidder shall visit the Jhansi plant and physically see the work area/areas in order to have visualization of the work content involved for the above works.

Qualifying Requirements

1. Copy of PAN Card to be submitted.
2. Copy of GST Registration to be submitted.
3. Self Declaration undertaking duly signed with stamp of the bidder on Stamp Paper of Rs 100/- to be submitted.
4. Copy of independent ESI Registration.
5. Signed copy of Blank Price Bid.
6. (A) The bidder should have the experience of having successfully completed similar work against completed work order during the last seven years ending on **30.09.2019** amounting to values mentioned as under:
 - (1) One Work valuing not less than **Rs 67.93 Lakhs**.
Or
 - (2) Two works each valuing not less than **Rs 42.46 Lakhs**.
Or
 - (3) Three works each valuing not less than **Rs 33.96 Lakhs**.

Definition of Similar Work: **All type of civil construction/renovation/maintenance works.**

(Note: For verification by the department, work order copy and work completion certificate mentioning successful completion by the client shall be submitted by the vendor. If the work is done for a private customer, relevant TDS Certificate (TRACES Only) must be submitted as evidence in addition to above work completion certificate & work order copy by the vendor.

(B) Turnover criteria: Average annual financial turnover during the last three years, ending **31st March, 2019 {i.e. FY-2016-17, FY-2017-18 and FY-2018-19}** applicable as per norm shall be at least **Rs 25.47 Lakh**. Financial statement (Balance sheet and Profit & loss account) duly audited by CA to be submitted as supporting documents. If not all balance sheet / financial statement are available for three years than the average shall be calculated by dividing the sum of turnover of submitted balance sheet/Financial statement by three.

Note: Provisional turnover for the FY 2018-19 duly certified by C.A. shall also be acceptable for evaluation purpose.

7. Taxes & Duries, Payment Terms, Bonus & LD Clause will be as per GTC issued by "Central Contracting Cell" and "Special Conditions of Contract for Civil Works" of BHEL Jhansi.
8. Documentary proof in support of above eligibility criteria along with EMD shall be submitted along with Techno Commercial Bid.
9. The documents required for legal entities under whose name and style contractor has participated in the tender are as follows:
 - (i) Partnership Firm: Partnership Deed & registration certificate issued by office of registrar of Firms.
 - (ii) Company: Certified copy Memorandum of Association, Article of Association and Incorporation Certificate.
 - (iii) Society: Registration certificate issued by Registrar of societies.
 - (iv) Sole Proprietor-ship: Undertaking on oath (Rs. 100 stamp paper) that Proprietor is solely responsible for all rights and liabilities while working under the name and style of Sole Proprietorship firm namely (_____)

GENERAL TERMS AND CONDITIONS OF ENQUIRY FOR WORKS
CONTRACTS (JHS2055C R00)

UPLOADED IN SEPERATE FILE - PAGE NO 01 TO 14
(To be signed by contractor and submitted along with bid)

FREE ISSUE MATERIAL TO THE CONTRACTOR**SCHEDULE "A"**

S No.	Particulars	Rs.	Quantity
1	Cement	Free of cost	As required
2	TMT	Free of cost	As required
3	Structural Steel	Free of cost	As required
4	Tool and Plant	Chargeable Basis	As required

Note: Tools and Plants if issued to contractor on chargeable basis than the amount shall be deducted as per rates decided by BHEL prior to issue.

SPECIAL CONDITIONS OF CONTRACT FOR CIVIL WORK**1. Special Conditions of Contract for Civil Work**

- a) These special conditions supplement the conditions enumerated in the tender and contract and the other general conditions of contract and form part of the contract documents. Where these special conditions are at variance with the general conditions of contract these special conditions shall prevail.
- b) The rate quoted for reinforced cement concrete items shall include smooth finishing of exposed faces. The top surfaces of roof slab shall be laid to specified slope and mortar that comes to surface due to vibrations shall be trowel led so as to obtain smooth and even surface.
- c) The BHEL reserves the right to deviate either by additions or by deductions from the schedule of items of work given in the tender document after awarding work.
- d) In case of any difference between agreement, wording and detailed drawings the interpretation of the BHEL shall be final and binding on the contractor.
- e) The final acceptance of work in all items are subject to proper performance after testing regardless of whether the items are paid for or not.
- f) If discrepancy in specifications observed between schedule of quantities and general / technical conditions, the specifications in schedule of quantities will have precedence over the general / technical conditions.
- g) Water will be supplied free of cost at one point for drinking and construction.
- h) Quantity records shall be prepared, maintained and submitted by contractor on regular basis during the course of execution. Test records shall be prepared, maintained and submitted by contractor during the course of execution and as demanded by Engineer-In-Charge. Contractor shall strictly adhere to quality requirements and shall follow the norms mentioned in Field Quality Plan (if applicable).
- i) In case of defective work BHEL will have full right to reject the work or part thereof. Such defective work if any, will have to be rectified by the contractor at his on cost. The opinion of Engineer in charge shall be final in this matter. If the defective work is allowed to stand BHEL shall have the absolute right to reduce the rates for such items and the contractor shall have no claims over such defective work allowed on reduced rates.
- j) The contractor shall have to make his own storage sheds for materials to be issued by BHEL. If deemed necessary by engineer in charge, the contractor shall make separate store for cement with double lock system. The empty cement bags shall be stocked at one place and at least 90% of them shall be returned to BHEL at BHEL stores in good condition without any additional payment. Therefore, if the total quantity of 90% empty cement bags is not returned by the contractor, the same will be recovered at the rate of Rs 3/- per bag from the bills.
- k) For all natural minerals used in the work like sand, aggregate, bricks, etc royalty certificate (MM-11) must be submitted along with bills. If royalty certificate is not submitted the cost of royalty shall be deducted from contractors bill as per prevailing Govt. order including penalty as applicable.
- l) Any electric power required for contractors' lighting/machinery for the purpose of work including fabrication work shall be supplied FREE OF COST at one point by the company on the written request of the contractor, subject to the observance of rules and regulations of Electric board / company. If it is observed that power is being wasted, BHEL shall have the right to recover cost of such consumption

including arrears. Power will not be allowed for cooking and room (air) heating in winter season: For this purpose, on written application chargeable power can be allowed. The rates shall be the rates applicable for industrial consumption in U.P.

2. TAXES AND DUTIES

- a) Price quoted shall include all taxes/Duties/Royalties applicable as on date of submission of tender except GST.
- b) GST (as applicable) shall be payable additionally to the contractor at actuals at the rate prevailing at the time of execution against submission of GST registration no and production of documentary proof of payment of GST to the concerned Govt. Deptt. (as applicable).
- c) No claim shall be admissible on account of upward or downward revision in rate of existing taxes & duties (except GST as applicable) subsequent to bid submission. However, if any new taxes & duties are introduced subsequent to bid submission and during the currency of the contract including its extension if any for the reasons not attributable to the contractor, the same shall be reimbursed at actual against documentary evidence of remittance by the contractor. In case the contract period is extended for the reasons attributable to the contractor, no such reimbursement shall be made during extended period.
- d) Income Tax & other deductible tax (if any) shall be deducted at source (TDS) as per prevailing rules and certificate to this effect shall be provided to the contractor.
- e) Contractor to ensure timely remittance of SGST, CGST, IGST as applicable in time as per law.
- f) Contractor to ensure compliance to filing of monthly GST sales return including BHELs supplies by 10th of next calendar month in the online GST portal wherever applicable.
- g) Contractor to declare filing of timely returns and GST remittance/likely remittance /ITC adjustment along with invoice.
- h) Contractor to submit invoices compliant with GST invoice rules.
- i) Contractor to comply with all statutory provisions as may be applicable at the time of dispatch/sale. Any additional financial liability to BHEL on account of non-compliance by contractors shall be borne by them and shall be adjusted/ recovered from the contractor. BHEL reserves the right to review the existing offers/contacts for any revision in terms, which may arise due to change in any statutory provision to ensure that the benefit accrues to BHEL.
- j) Contractor to ensure TAX INVOICE submission to BHEL.
- k) In respect of cases where the liability to discharge GST is on BHEL under reverse charge mechanism, contractors have to ensure timely submission of invoices and delivery of material/services to BHEL, so that there is no mismatch on both activities. In case there is any additional financial liability on BHEL on account of default on the part of the contractor on submission or delivery of material/services the same shall be passed on to them.
- l) In respect of free issue material by BHEL, contractors have to return the processed material within the time line as per the provisions of GST. In case of any additional tax liability on BHEL on account of non- compliance by the contractor, the additional financial implications on BHEL shall be passed on to the contractor.
- m) Contractors to provide the applicable HSN/SAC codes as called for in the enquiry.
- n) As per provisions of section 171 of the CGST ACT 2017, bidders to pass on the anti - profiteering benefits accruing to them under GST regime to BHEL.
- o) In case of input credit is not available as denied by GST Portal due to in proper documentation or wrong uploading of data by bidder, the same will be recovered from bidder along with interest, if any.

3. PROVISION OF BONUS

Early completion of work is acceptable by BHEL. However no reward/bonus on any early closure shall be admissible.

4. OVER RUN COMPENSATION (ORC)

Not applicable in this contract.

5. PRICE VARIATION COMPENSATION (PVC)

Not applicable in this contract.

6. MATERIAL HANDLING AND STORAGE

Adequate arrangement be made for material handling & storage taking due care against damages.

7. ACCOUNTING

- a) Proper method of accounting of steel, tore steel, cement & scrap material be followed. The books of such accounting be offered for auditing by BHEL at pre-decided regular interval.
- b) All debris and surplus materials shall be cleared from the site as and when directed by the Engineer-in-charge. Any temporary structure / stores made by the contractor for the work shall be demolished and site cleared before payment of final bill.
- c) Structural steel wastage /scrap shall be permissible upto 2% of total quantity of issued quantity. The wastage /scrap steel must be return by contract for reconciliation of steel. Wastage scrap beyond 2% will deducted @ Rs.75 per kg.

8. OVERPAYMENTS AND UNDERPAYMENTS

- a) Where-ever any claim for the payment of a sum of money to the company/ corporation arises out of or under this contract against the contractor the same may be deducted by the company/ corporation from any sum then due or which at any time thereafter may become due to the contractor under this contract and failing that under any other contract with the company/ corporation or from any other sum due to the contractor from the company/ contractor (which may be available with the company/ corporation) or from his security deposit, or he shall pay to claim on demand.
- b) The company/ corporation reserves the right to carry out post-payment audit and technical examination of the final bill including all supporting vouchers, abstracts, etc. the company/ corporation further reserves the right to enforce recovery of any overpayment when detected, notwithstanding the fact that the amount of the final bill may be included by one of the parties as an item of dispute before an arbitrator appointed under this contract and notwithstanding the fact that the amount of the final bill figures in the arbitration award.
- c) If a result of such audit and technical examination any overpayment is discovered in respect of any work done by the contractor or alleged to have been done by him under the contract, it shall be recovered by the company/ corporation from the contractor by any or all of the methods prescribed above or if any under payment is discovered, the amount shall be duly paid to the contractor by the company/ corporation.
- d) Provided that the aforesaid right of the company/ corporation to adjust over payments against amounts due to the contractors under any other contract with the company/ corporation shall not extend beyond the periods of two years from the date of payment of the final bill or in case the

final bill is a MINUS bill, from the date the amount payable by the contractor under the MINUS final bill is communicated to the contractor.

- e) Any amount due to the contractor under this contract for under payment may be adjusted against any amount then due or which may at any time thereafter become due before payment is made to the contractor, from him to the company/ corporation on any other contract or account whatsoever.

9. METHODS OF MEASUREMENTS

Except where any general or detailed description of the work in quantities expressly shows the contrary, schedule of quantities shall be deemed to have been prepared and measurements shall be taken in accordance with the procedure set forth in the schedule of rates – specification notwithstanding any provision in the relevant standard method of measurement or any general or local custom. In the case of items which are not covered by the CPWD schedule of rates – specification, measurement shall be taken in accordance with the relevant standard method of measurement issued by the Indian standards institution.

10. TIME LIMIT FOR PAYMENT OF FINAL BILL

The final bill shall be submitted by the contractor within three months of physical completion of the works. No further claim shall be made by the contractor after submission of the final bill and these shall be deemed to have been waived and extinguished. Payment of those items of the bill in respect of which there is no dispute and of items in disputes of quantities and at rates as approved by Engineer-in-charge, shall be made six month, the period being reckoned from the date of receipt of the bill by the Engineer-in-charge. After payment of the amount of the final bill payable as aforesaid has been made, the contractor may if he so desires, reconsider his position in respect of the disputed portion of the final bill and if he fails to do so within 90 days, his disputed claim shall be dealt with as provided in the contract.

11.TOTAL SCOPE AT A GLANCE

S.No.	Description	Scope of	
		BHEL	Bidder
1	Open space		
1.1	Open space for storage of material required.	Yes	
1.2	For fabrication.	Yes	
1.3	Covered/ready to use office rooms for projects.		Yes
1.4	Space for lodging for workers (Outside factory premises)		Yes
2	For living purpose of bidder staff		
2.1	Lodging & Boarding for Executives.		Yes
2.2	Lodging & Boarding for Workers.		Yes
3	Electricity		
3.1	Provision of electricity at single point.	Yes	
3.2	Further distribution of Electricity including required material and execution.		Yes
4	Water Supply		
4.1	Making the water available at single point	Yes	
4.2	Further distribution as per the requirement of work including supply of material and execution.		Yes
5	Transportation		
5.1	For project purposes		Yes
5.2	For the site personnel of the bidder		Yes
5.3	For the bidder equipment and consumables (T & P, Consumables etc.)		Yes
6	Lighting		
6.1	For Construction work (Supply of all the necessary materials & Execution)		
A	At office storage area		Yes
B	At the preassembly area		Yes
C	At the construction site /area		Yes
7	Communication Facility for site operation		
7.1	Telephone, internet, e-mail etc.		Yes
8	Shop Crane, if available (Free of Cost)	Yes	

TECHNICAL SPECIFICATION

1. The works shall be executed with the directions, instructions, which shall be given to the contractor by BHEL from time to time and as per technical specifications in price schedule and drawings available in the office to give a general idea of the work to be executed and is liable for modifications during the actual execution based on the designs prepared and approved by the Competent authority.
2. For execution of all scheduled items CPWD specifications and relevant is codes are to be followed. For execution of non-scheduled items specifications enclosed with this tender are to be followed.
3. Specialized works are to be executed by specialized agency with the approval of BHEL.
4. The materials in the scope of contractor shall have to be got approved by the contractor from the Engineer-in-charge before supplying inside the factory area. These materials should be accompanied by certificate. Testing of these materials shall be carried out at any BHEL or Govt approved/NABL apporved lab whose cost will be borne by the contractor.
5. Contractor shall ensure that quality is maintained in all works connected with this contract at all stages as per requirement of BHEL. Contractor shall ensure all inspection, measuring and testing equipment are calibrated by authorized agency and valid calibration must be available with them for verification by BHEL.
6. Test Certificates are to be supplied for all major bought-out items as required by the Engineer-in-charge.
7. Daily Log book should be maintained for the job in duplicate (1 for BHEL and 1 for Contractor) for detailing incorporating alignment/clearness/centering/labeling/Reading and inspection details and FQP (field quality plan).
8. The contractor shall be fully and finally responsible for correctness and quality of his work to the entire satisfaction of the BHEL/Customer.
9. If in the opinion of the contractor any work is insufficiently specified or required modifications, the contractor shall refer the same in writing to the Engineer and obtain his instruction/approval in writing before proceeding with the work. If contractor fails to refer such instance, any excuse for faulty erection, for poor workmanship or delay in completion shall not be entertained.
10. Material reconciliation ststement has to be submitted by the contractor as & when required by BHEL.

Laying and Fixing of Galvalume sheet

- i) The sheets shall be laid and fixed in the manner described below, unless otherwise shown in the working drawings or directed by the Engineer-in-Charge.
- ii) The sheets shall be laid on the purlins to a true plane, with the lines of corrugations parallel or normal to the sides of the area to be covered unless otherwise required as in special shaped roofs.
- iii) The sheets shall be laid with a minimum lap of 15 cm at the ends and 1 ridge of corrugations at each side. The above minimum end lap of 15 cm shall apply to slopes of 1 vertical to 2 horizontal and steeper slopes. For flatter slopes the minimum permissible end lap shall be 20 cm. The minimum lap of sheets with ridge, hip and valley shall be 20 cm measured at right angles to the

line of the ridge, hip and valley respectively. These sheets shall be cut to suit the dimensions or shapes of the roof, either along their length

or their width or in a slant across their lines of corrugations at hips and valleys. They shall be cut carefully with a straight edge chisel to give a smooth and straight finish.

iv) Sheets shall not generally be fixed into gables and parapets. They shall be bent up along their side edges close to the wall and the junction shall be protected by suitable flashing or by a projecting drip course, the latter to cover the junction by at least 7.5 cm.

v) The laying operation shall include all scaffolding work involved.

vi) Sheets shall be fixed to the runner, purlins or other roof members such as hip or valley rafters etc. with Self Tapping Screw/self-drilling screw with EPDM washer.

vii) Finishing: The roof when completed shall be true to lines, and slopes and shall be leak proof.

viii) Measurement

The length and breadth shall be measured correct to a cm. Area shall be worked out in sqm correct to two places of decimal.

The superficial area of roof covering shall be measured on the flat without allowance for laps and corrugations. Portion of roof covering overlapping the ridge or hip etc. shall be included in the measurements of the roof.

Roof with curved sheets shall be measured and paid for separately. Measurements shall be taken on the flat and not girthed.

No deduction in measurement shall be made for opening upto 0.4 sqm and nothing extra shall be allowed for forming such openings. For any opening exceeding 0.4 sqm in area, deduction in measurements for the full opening shall be made and in such cases the labour involved in making these openings shall be paid for separately. Cutting across corrugation shall be measured on the flat and not girthed. No additions shall be made for laps cut through.

Ridges, Hips, flashing, corner pieces

i) Ridges Hips, flashing, corner pieces of galvalume sheet roof shall be covered with ridge Hips, flashing, corner pieces sections of plain galvalume sheet with a minimum lap of 20 cm on either side over the galvalume sheets. The end laps of the ridges Hips, flashing, corner pieces and between ridges Hips, flashing, corner pieces shall also be not less than 20 cm. The ridges Hips, flashing, corner pieces shall be of 60 cm overall width plain Galvalume sheet, 0.5 mm thick as given in the description of the item and shall be properly bent in shape.

ii) Finish: The edges of the ridges and hips shall be straight from end to end and their surfaces should be plane and parallel to the general plane of the roof. The ridges and hips shall fit in squarely on the sheets.

iii) Measurement: The measurements shall be taken for the finished work in length along the centre line of Ridges Hips, flashing, corner pieces, as the case may be, correct to a cm. The laps in Ridges Hips, flashing, corner pieces and between ridges and hips shall not be measured.

GUTTERS

Gutter shall be fabricated from plain G.S. Sheets of thickness as specified in the item. Eaves gutters shall be of the shape and section specified in the description of the item. The overall width of the sheet referred to therein shall mean the peripheral width of the gutter including the rounded edges. The longitudinal edges shall be turned back and beaten to form a rounded edge. The ends

of the sheets at junctions of pieces shall be hooked into each other and beaten flush to avoid leakage.

Slope - Gutter shall be laid with a minimum slope of 1 in 120.

Laying and Fixing

1. Gutter shall be supported on and fixed to M.S. flat iron brackets bent to shape and fixed to the requisite slope. The maximum spacing of brackets shall be 1.20 metres.
2. Where these brackets are to be fixed to the sides of rafters, they shall be of 40×3 mm section bent to shape and fixed rigidly to the sides of rafters with 3 Nos. 10 mm dia bolts, nuts and washers.
3. The brackets shall overlap the rafter not less than 30 cm.
4. Where the brackets are to be fixed to the purlins, the brackets shall consist of 50×3 mm M.S. flat iron bent to shape with one end turned at right angle and fixed to the purlin face with 2 Nos. of 10 mm dia bolts nuts and washers. The bracket will be stiffened by provision of 50×3 mm. M.S. flat whose over hung portion bent to right angle shape with its longer leg connected to the bracket with 2 Nos. 6 mm dia M.S. bolts, nuts and washers and its shorter leg fixed to face of purlin with 1 No. 10 mm dia, bolt, nut and washer. The over hang of the vertical portion of the bracket from the face of the purlin shall not exceed 22.5 cm with this arrangement. The spacing of the brackets shall not exceed 1.20 metres.
5. The gutter shall be fixed to the brackets with 2 Nos. G.I. bolts and nuts 6 mm dia, each fitted with a pair of G.I. and bitumen washers. The connecting bolts shall be above the water line of the gutters.
6. For connection to down take pipes, a proper drop end or funnel shaped connecting piece shall be made out of G.S. sheet of the same thickness as the gutter and riveted to the gutter, the other end tailing into the socket of the rain-water pipe. Wherever necessary stop ends, angles etc., should be provided.

Finish

The gutters when fixed shall be true to line and slope and shall be leakproof.

Measurements

Measurements shall be taken for the finished work along the centre line of the top width of the gutter connect to a cm. The hooked lap portion in the junctions and gutter lengths shall not be measured. The number of brackets which are fixed to purlins with stiffener flats should be measured.

Structural steel**Application of specification**

Notwithstanding, what stated in the specifications herein, general structural drawings and notes appended thereon, shall be deemed to form part of the specifications and to supersede the same in case of discrepancy.

All drawings submitted by the architects or Structural Engineer shall be checked for dimensions, figures, sizes and strength of structural members and connections and any discrepancy or inaccuracy shall be reported forthwith.

GENERAL

Full facilities shall be provided to enable the architect or the consultant or his representative to visit the workshop at any reasonable time for the purpose of inspecting equipment and structural steel work under fabrication. Similar facilities shall be provided at site.

A set of shop drawings bearing the approval stamp shall be supplied to the workshop inspector. A program or progress chart shall be drawn up within two weeks of intimation of the award in consultation with the architects. The program will be chalked out so as to start erection as fabrication progress.

Material

All raw materials are to be supplied by BHEL.

The process of manufacture and the quality of all steel used or structural members and connections shall be governed by the following requirements:

Mild steel shall conform to the requirements of latest editions of I.S. 226.

Other steel not complying with the above specification can be used only by approval in writing of the Architects or Consultant. If approval is obtained, due regard will be given to the yield point stress, ductility, ultimate resistance to tensions and other essential properties.

All sections must be free from seams, flaws, cracks, laminations or injurious defects of any kind.

TESTING AND INSPECTION

All materials used be inspected by the Engineer's representative and the contractor shall produce the manufacturers' test certificate.

SETTING OUT ON SITE

The contractor shall accept responsibility for accuracy in positioning and levelling of all steel work, plumbing in columns, and the placing of every part of structure in accordance with the approved drawings and to the satisfaction of the architect and the structural consultants. Any checking or approval of the setting out by the architect and the structural consultants shall not relieve the contractor of his responsibilities in this respect.

Foundations will be provided by the general contractor. Anchor bolts should be supplied by the contractor earlier to enable the general contractor to put these in foundation. The contractor will have to check for the correctness of the centres of bolts and in no case he shall get relieved of his responsibility in this respect.

Stanchion bases shall be mounted on steel wedges preferably square bar cutting of requisite size as packing clear of the top of footings, stanchions accurately set in position plumbed and leveled and the beam above fixed. The gap shall then be rammed solid with a stiff 1:2 cement mortar using minimum of water so as to entirely fill up the spaces.

Fabrication

General: All workmanship and finish of the fabricated steel work shall be of the highest class in every respect conforming to the best accepted standard of practice. Methods of fabrication, transportation and erection shall be such that the finished structure is free from defects or injuries, which would render it unfit for use. Greatest accuracy shall be observed to ensure that

all parts will properly fit together on erection. In repetition, work the standard of accuracy such that similar parts are infact, interchangeable.

Fabrication should conform to IS 800.

Straightening, planning, machining, etc.: Cold straightening & flattering of sections must be carried out by pressure and not by hammering. All materials before being used shall be straight and free from furs, etc. All ends of beams used as stanchions are to be machined or cut true, any burring of the edges being removed. Flange plates, if made from sheared plates, must have had at 1/8" removed on each sheared edge by planning.

Cutting: Cutting shall be effective by shearing, cropping or sawing. Sheared members shall be free from distortion at the sheared face.

Holes for Bolts and Rivets: Ordinary round holes are to be of a diameter 1/16" larger than the specified diameter of bolt or rivet. Where not otherwise stated, holes must be drilled or else punched 3 mm small and afterwards drilled or reamed (but not drifted) to the required size. All burrs due to punching or drilling must be removed. All holes for site connections must be accurately centered so as to render reaming or drifting during erection unnecessary. Multiple members such as flange plates to be drilled as far as practicable in one operation.

Rivets: Rivets to be of soft steel of the quality and to the test prescribed for rivets in I.S. 1148. Ordinary rivets to have cup head formed grom length of shank equal to not less than 40 mm diameters. Rivets on bearing surfaces to be flush counter - sunk whether indicated on the drawing or not. All rivets are to be machine-drawn as far as practicable and must completely fill the holes when closed. If loose or if the heads are badly formed, cracked or eccentric to the shank, or do not bear truly on the plate or bar, such rivets shall be cut out and replaced. All surface to be riveted to be in close contact throughout.

Bolts: Ordinary bolts & nuts to be of mild steel conforming to I.S. 1148. Bolt head and nuts to be hexagonal and to with worth standard, the heads being forged out of the solids, truly concentric and square with the shank which must be perfectly straight. Treads to be cut in oil and the fit of the nuts should be spanner tight. Bolts must be long enough, allowing for washers, to project (say 1/4") beyond the nut when tightened and the screwed portion must be long enough for subsequent tightening. When nut or bolt heads bear on the tapered flanges of joints, angles etc. bevel washers to be provided of corresponding taper. In all cases the threads should be clear of the parts bolted together. The nut shall be secured after tightening by barring when there is the risk of their becoming loose of accidental removal. Turned bolts to be driven soffit in the hole they occupy and to have the screwed portion 1/16" less in diameter than the shank and the bearing faces of the heads and nuts shall be machined squared. The shank of turned bolts shall have sufficient length to ensure contact through the entire thickness of the plates. Accordingly, washers, truly flat, must be provided under the nuts to ensure that they can be screwed home.

Connections: The assembly of fabricated parts shall be permitted only after all parts are properly straightened and are free burrs, mid oil etc. The Structural Engineer's drawings show only typical connection details. The main principal governing all connection between beams and columns shall be that all vertical loads are to be carried by riveted cleats, whereas sufficiently rigid and conditions take up binding moments, eccentric loading and/or wind pressure are to be accomplished by welding. All shop connections shall be riveted or welded. Head of rivets in surfaces carrying brick walls shall be flattened to 3/8".

Painting: The whole of the finished iron and steel work shall be cleaned of all scale, rust or dust and shall be thoroughly coated with one coat of freshly mixed re-lead paint before erection, well worked into joints and open spaces.

Steel work which will be entirely embedded in concrete is not to be painted but coated with two coats of Portland cement wash of the consistency of cream, the second coat being applied immediately prior to encasing. Where two surfaces will be permanently in contact, after assembly, each of them shall receive, immediately before being assembled after being thoroughly scrapped, one coat of red oxide paint and the surface shall be brought together while the paint is still wet.

Erection: The contractor must furnish and erect at his own expense all derricks, gantries, sheer legs, staging and centering necessary for the proper completion of the work and perform all adjustment required to place the material in its correct position in the completed structure.

His tender must include for all transport of materials on site and unloading and erecting, and care of the steel work during construction.

At the completion of the erection, the contractor must remove at this own cost all temporary staging, centering and other obstructions when ordered by the architects or Engineer and leave work in a neat and workman like condition.

Erection, in general, shall conform to I.S. 800. All parts of the structure shall be suitably lettered or numbered to facilitate erection at site.

Installment checking for correctness of setting up of structures as also the final adjustment should be carried out immediately after the completion of assembling of each block of building (frame work) in the sequence determined by the design. Crane girders and rails requiring higher accuracy while setting them up, should be adjusted after the consolidation of basic structures.

As each part of the contract works is erected, it shall be passed by the architect/consultants. This, particularly, applies to the accurate plumbing of all stanchions and columns, and to the levelling, setting and aligning of the various parts and to the fitting and adjusting of bearing plates and other parts. Previous ascertainment from the purchaser which parts they wish to inspect and pass from time to time but such passing in no way exonerate the contractor from any of his guarantee.

Supervision: The carrying out of all work included in this contract shall be supervised throughout by a sufficient number of qualified representatives of the contractor who have had through experience in the erection structure similar to that to be supplied.

Tests: The contractor shall carry out the test specified (at the manufacturer's works) and are necessary to determine that the contractor's work comply with the conditions of the specifications. The cost of such tests should be borne by the contractor.

Clearance: The erection clearance for cleated ends of members connecting steel to steel not be greater than 1/16" at each end. The erection clearance at ends of beams without wed cleats shall be not more than 1/8" at each end. Where, for practical reasons, greater clearance is necessary, suitably designed seating shall be provided.

METAL ARC welding

Electrodes: All electrical welding shall be carried out with coated electrodes of best make to conform to relevant Indian Standards. The welding procedure shall be taken as meaning the following:

Size of electrodes in S. W. G.

Current in amperes

Number of runs

Length of run per electrode

Position of welding

Welding sequences

The welding procedure shall be arranged to suit the details of joints as indicated on the drawings and the position in which the welding is to be carried out and shall be such as to ensure that the weld metal can be fully and satisfactorily deposited throughout the length and thickness of all joints.

The contractors shall record the welding procedure and shall provide each operator with all relevant details.

Butt welds: All steel parts shall before butt welding, be separated by a gap the dimension of which shall be shown on the drawings. The ends of the butt welds shall be extended so that the weld metal at the extreme ends of the weld is sound and the additional metal shall be afterwards ground smooth. In all other respects butt welds shall conform to the requirements of I.S. 815.

Fillet welds: Minimum leg length of the fillet welds to be deposited shall be not less than the specified size. The throat of the fillet weld so deposited shall be not less than 7/10ths of the specified size.

Where a fillet is applied to the rounded toe of a rolled section the specified size of the weld shall generally not exceed 3/4 of the thickness of the sections of the toe.

Fillet welds terminating at the ends of the sides or parts of members shall, where ever practical, be returned continuously around the corners about a distance not less than twice the size of the welds.

In all other respects, fillet welds shall conform to the requirements of I.S. 816,

Welding Standards: The surface to be welded and the adjoining metal for a distance of atleast 15mm. must be cleaned free of rust, scale paint, etc., by a wire brush.

Means must be adopted to minimize distortion of the finished parts, e.g. by jigs, tack welding or other effective means, and shall be securely held in their relative positions during welding.

For fusion faces, which require to be cut, a special form or shape may be cut by shearing, clipping or gas cutting.

In all cases the prepared fusion faces should be regular and should be dressed by chipping, filling or grinding.

Each bead of metal must have the slag removed by light hammering and wire brushing before the next bead is deposited.

The weld must show a good clean contour and on a cut specimen, good fusion with purest metal.

The current used must be within the range defined by the electrode manufacturers.

Under-cutting must be avoided and if it occurs, any reduction of area from this cause must be made good by an additional run. Before applying paint to welded joints, they should be carefully chipped or wire brushed.

Adequate steps shall be taken to ensure that the work is of the highest quality and thoroughly reliable so that all work is done under competent and skilled supervision.

Mode of measurements: Rate for fabrication, supply and erection shall be quoted on the basis of unit price per metric tonne which rate will be applied to the estimated weight of finished

steel work. The weight shall be figured on the basis of minimum rectangular dimensions of all plates and the minimum rectangular overall dimensions of all structural shapes with no deductions for copes, clips, sheared edges, etc. and the theoretical weights of the steel section in accordance with the I.S. Specifications, no deduction being made for bolt and rivet holes. Deductions shall not be made for skew cuts. No allowances shall be made for extra weight due to rivet heads and nuts or welded material and rolling margins.

The structural steel including chequered plates shall be supplied by the OWNER free of cost. The rate shall be inclusive of supply of all raw materials, fabrication, delivery at site and erection, oiling and painting, temporary erection etc. all bolts and nuts, electrodes and electrical energy for welding.

Electrical Energy: Electricity will be supplied by the owners at one suitable point free of charge and further distribution cost will have to be borne by the contractor. Contractor will put his own tested meter and bear energy consumption charges as per meter reading, and prevalent rates.

Metal Work: Steel used in the manufacture of rolled steel sections shall conform to IS 226 and IS 1977 latest edition or any alternative quality of steel subject to structural.

PAINTING

- i.The scope of work include supply and application of paint as per painting specification.
- ii.Although most of the structures, assemblies, shall be received in painted condition, however for surfaces which are worked upon, surface paint damages, scratches, worn out, surface paint faded etc. the scope of work shall also include supply and application of paint as per painting specification. Additionally if any item is received in unpainted condition, that too shall fall in this scope of work.
- iii.All exposed metal parts like trusses, purlin, hooks and allied structure unless otherwise surface protected, be first painted after thoroughly cleaning all such parts duct, rust, scales, grease, oil and other foreign materials. The same after inspected and approved by BHEL/Customer Engineers shall be released for painting. The instrument for checking the thickness of coat is to be procured by contractor and should be calibrated after periodical intervals.
- iv.Paints, thinner and brush, emery sheets, platform materials and other consumables shall be arranged by the contractor at his cost.

PAINTING SPECIFICATION

This section covers the painting requirements for the package equipment, structures, piping etc. and any other surface required to be painted.

The paint/primer (Red oxide) to be used shall be of standard make and shall be approved by the Engineer-in-charge before applying.

The tenderer should specify the plant and machinery such as a pan mixer, vibrators, steel shuttering etc., that he possesses and is going to use them on the work.

PREPARATION OF SURFACES

All surfaces to be painted shall be thoroughly cleaned of all grease, oil, loose mill scale, dust, rust and any other foreign matter. Mechanical cleaning by power tool and scrapping with steel wire brushes shall be adopted to clear the surfaces. However, in certain locations where

power tool cleaning cannot be carried out, sand scrapping may be permitted with steel wire brushes and/or abrasive paper. Cleaning with solvents shall be resorted to only in such areas where other methods specified above have not achieved the desired results.

PRIMER PAINTS (P)

Primer paints shall be applied only on dry and clean surfaces:

FINISH PAINT

Finish paint Two or more coat shall be applied over primer coats and intermediate coats after proper cleaning and touch up of primed coats.

The colour/ shade shall be as approved by the BHEL. After cleaning the dust on the dried up primer, first coat of synthetic enamel shall be applied. After this first coat dries up hard, the surface is wet scrubbed cutting down to a smooth finish and ensuring that at no place the first coat is completely removed. After allowing the water to get evaporated completely, the second finish coat of synthetic enamel paint shall be applied.

Equipment no. and the name of the equipment shall be painted on the surface of the Equipment on visible locations. Service of the Pipe/Line designation with arrow identification for the direction of flow shall be painted on all pipes at visible locations at an interval of 02 metres. Wherever pipe lines are insulated, the service of the piping and arrow mark shall be painted over the clad surface.

PAINT APPLICATION

Paint shall be applied in accordance with manufacturer's recommendations. The work shall generally follow IS 1477 (Part II) for jobs carried out in India. Paint shall not be applied when the ambient temperature is 5 deg. C and below. Also paint shall not be applied in rain, wind, fog or at relative humidity of 80% and above. Each coat of paint shall be continuous, free of pores and of even film thickness without thin spots. Each coat of paint shall be dry sufficiently before application of next coat.

The Contractor shall furnish paint manufacturer's test report or technical data sheet pertaining to the paint selected. The data sheet shall indicate among other things the relevant standards, if any, composition in weight percent of pigments, vehicles, additives, drying time, viscosity, spreading rate, flash points, methods of application quality of surface preparation required, corrosion resistance properties and color.

Note:

- In execution of civil works CPWD latest specification is to be followed first: if CPWD specification does not provide details of specification of any item of work then best of the other specification to be followed.

The above list of technical specification is indicative and not exhaustive and shall include any other work/process not mentioned above but becomes important for successful completion of the entire work