



**बाल्मर लॉरी एण्ड कं. लिमिटेड**  
**Balmer Lawrie & Co. Ltd.**

**TEMPERATURE CONTROLLED WAREHOUSE**  
[PLOT NO. F-9/5, ADDITIONAL MIDC]  
PATALGANGA, DIS- RAIGAD, MAHARASHTRA  
Mobile No: +91 9866400155  
E-mail: [choudhary.rr@balmerlawrie.com](mailto:choudhary.rr@balmerlawrie.com)]

**Tender No: BL/LI/TCW-MUM/028 dt.03.11.2018**  
**TECHNICAL / COMMERCIAL BID**

**Inviting Tender for**

**[Main Gate and Miscellaneous Civil Works]**

**DUE DATE & TIME: [10/11/2018 AT 17.00 HRS ]**

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Seal & Signature of the Bidder

## NOTICE INVITING TENDER

Online Bids in single bid system are invited from registered vendors of Balmer Lawrie & Co. Ltd for carrying out the Main Gate and Miscellaneous Civil Works at Temperature Control Warehouse at Patalganga in Raigad district, Maharashtra.

Tenderers are advised to download Notice Inviting Tender along with other tender documents from [www.balmerlawrie.com](http://www.balmerlawrie.com) and the procurement website <https://balmerlawrie.eproc.in>.

The tender has to be submitted online only.

The signed copies of the required documents in support of bidder's credentials are to be send along with the tender documents.

S. No	Description	Details
1	Name of Work	<b>Main Gate and Miscellaneous Civil Works at Temperature Controlled Warehouse at Patalganga.</b>
2	Tender No	<i>BL/LI/TCW-MUM/028 DT.03.11.2018</i>
3	Validity Of Offer	120 days from the date of opening of Technical bid
4	Contract Period	<b>30 Days from the date Of placement of Order or LOI whichever is earlier.</b>
5	Tender Fee	<b>Nil</b>
6	EMD	<b>Rs. 10000 /-</b>
7	Downloading / Submission of Tender :	
	a. Starts on	<b>03/11/2018 at 19.00 Hrs</b>
	b. Closes on	<b>10/11/2018 at 17.00 Hrs.</b>
8	Opening of Tender	<b>10/11/2018 at 17.30 Hrs</b>

### 1. LIST OF DOCUMENTS TO BE SUBMITTED

The signed and stamped copies off following documents should be sent as part of the technical/commercial bid submission

- a. Power of Attorney authorizing the person who has signed the tender to act and sign on behalf of the company.
- b. Certificate of registration/incorporation in the case of Pvt Ltd/Public Ltd Company /certified copy of / partnership deed in the case of LLP/Partnership firm/ any document under the relevant rules/laws if the firm is a proprietorship firm.
- c. Company's PAN.
- d. Company's GST Registration.
- e. Chartered accountant's certificate or Audited / Certified Balance sheet and Profit and Loss account of tenderer's company for last three years ending 31.03.17

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## **2. VERIFICATION OF DOCUMENTS / SUBMISSION OF BIDS / CANCELLATION OF BIDS**

- a. If Balmer Lawrie wants to verify all the submitted documents, then the bidder should bring all original documents.
- b. Failure on part of the tenderer to report on specified date and time for paper verification may result in rejection of the tender submitted by them without further communication.
- c. Tenderer should be in a position to produce all the original documents and/or any other information on dates as intimated or as and when required by Balmer Lawrie.
- d. Incomplete Tenders are liable for rejection without any reference to the tenderer and decision of Balmer Lawrie in this respect will be final.
- e. If at any stage it transpires that any party submitted false or forged documents may be Blacklisted and the EMD would be forfeited, contract could be cancelled, criminal prosecution or any other action as deemed fit may be initiated.
- f. Balmer Lawrie reserves the right to reject any or all tenders without assigning any reasons whatsoever.
- g. Bids of any tenderer may be rejected if a conflict of interest between the bidder and Company (Balmer Lawrie) is detected at any stage.
- h. All the bids will be evaluated based on the criteria as mentioned in this NIT. Tenders of those bidders who are not meeting the criteria as specified in the NIT, may not be considered for commercial evaluation.
- i. Tenders, if submitted through e-mail or fax, shall be summarily rejected.

### **SPECIAL INSTRUCTIONS TO THE BIDDER FOR PARTICIPATING IN E-TENDER**

Tenderers are advised to download Notice Inviting Tender along with other tender documents from the e-tendering portal <https://balmerlawrie.eproc.in> Interested parties have to pay an interest free EMD of Rs.10000/- (**Rupees Ten Thousand Only**) by Demand Draft/Pay Order at our above address. The DD/PO for EMD should be drawn in favour of "**BALMER LAWRIE & CO LTD**" on any Scheduled Bank, payable at [**Mumbai/ Navi Mumbai**]. Copies of the instruments (DD) evidencing payment of EMD should be scanned & uploaded before bidding. Payment of EMD is exempted for Small Scale Units registered with National Small Industries Corporation (NSIC) & Micro Small and Medium Enterprises (MSME) on submission of valid copy of registration certificate. **SCT/ST Category having MSMED/NSIC certificates should specifically mention the same.** MSME agencies should declare their UAM number in the CPPP portal, if the same is not mentioned in the CPPP portal then you shall not be entitled for any benefits for being MSME /NSIC.

The physical original instruments/drafts should reach our above address prior to due date and time. In case the Bidders intend to submit any additional supporting documents, the same can be submitted in physical form at our above address. Documents of only those bidders shall be entertained who are bidding on-line. **UNDER NO CIRCUMSTANCES PRICE BID SHALL BE**

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## SUBMITTED IN PHYSICAL FORM.

Balmer Lawrie & Co. Ltd. has developed a secured and user friendly system which enables Vendors/ Bidders to Search, View, Download tenders directly and also, enables them to participate & submit Online Bids on the e-tendering site <https://balmerlawrie.eproc.in> in a secure and transparent manner which maintains confidentiality and security throughout the tender evaluation process.

### 1. Procedure to submit On-line Bids

For this purpose, Vendors/Bidders are advised to read the instructions available in the homepage of the portal <https://balmerlawrie.eproc.in> where detailed procedure for submission of bids is available under the option / link "Bidding Manual".

#### 1.1 Registration with e-procurement platform

For registration and online bid submission bidders may contact HELP DESK of C1India Pvt., Ltd. details of which is available at our web-site mentioned above or they can register themselves online by logging in to the website through <https://balmerlawrie.eproc.in>

Bidders may contact the following resource persons for any assistance required in this regard.

HELPDESK NOS ARE OPEN BETWEEN 1000 HRS to 1830 HRS IST (MONDAY TO FRIDAY (Exclusions: Balmer Lawrie HOLIDAYS))		
Please email your issues before your call helpdesk. This will help us serving you better.		
Contact Nos. and email IDs for Balmer Lawrie helpdesk officers		
Name	E-mail	Phone Numbers
Tirtha Das	<a href="mailto:Tirtha.das@c1india.com">Tirtha.das@c1india.com</a>	+91-9163254290
Ravi Gaiwal	<a href="mailto:Ravi.gaiwal@c1india.com">Ravi.gaiwal@c1india.com</a>	02266865611
Tuhin Ghosh	<a href="mailto:Tuhin.ghosh@c1india.com">Tuhin.ghosh@c1india.com</a>	+91-8981165071
Ujjal Mitra	<a href="mailto:ujjal.mitra@c1india.com">ujjal.mitra@c1india.com</a>	+91-77026 69806

#### 1.2 Digital Certificate authentication

The bidder shall authenticate the bid with his Digital Certificate for submitting the bid electronically on e-procurement platform and the bids not authenticated by digital certificate of the bidder will not be accepted on the e-procurement platform.

All the bidders who do not have digital certificates need to obtain Digital Certificate. They may contact help desk of C1 India Pvt. Ltd.

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**1.3 For Price Bid Submission, the bidders are required to download the Excel Sheet of Price Bid, fill the relevant details and upload the same after signing and stamping.**

**2. Special Note**

- Bids can only be submitted before the last date and time of submission as per the date and time mentioned in the e-tender. Resubmission (if required) of bid should be completed within the stipulated date and time. The system time (IST) that will be displayed on e-tendering web page shall be the time and no other time shall be taken into cognizance.
- Bidders are advised in their own interest to ensure that bids are uploaded and submitted successfully in e-tendering system well before the closing date and time of bid.
- No Price bid will be accepted physically or by post. Balmer Lawrie does not take any responsibility in case bidder fails to upload the documents within specified time of tender submission.
- Balmer Lawrie will not be responsible for any delay under any circumstances for non-receipt of any documents sent by post as part of response to the tender. Bidders are requested to provide correct “e-Mail address” and “Mobile No.” for receiving updates related to e-tender from time to time.
- Bidders are requested to provide correct “e-Mail address” and “Mobile No.” for receiving updates related to e-tender from time to time.
- The bidder has to keep track of any changes by viewing the Addendum/Corrigendum issued by the Tender Inviting Authority on time-to-time basis in the e-Procurement platform. The Company calling for tenders shall not be responsible for any claims/problems arising out of this.
- **The bidder has to keep track of any changes by viewing the Addendum / Corrigenda issued by the Tender Inviting Authority on time-to-time basis in the e-Procurement platform. Interested parties have to keep referring to the website for further information. The Company calling for tenders shall not be responsible for any claims/problems arising out of this.**

**3. Filling of Tender Documents**

- 3.1 The tenderers are requested to carefully study all the tender documents and tender conditions before quoting their rates.
- 3.2 The tender must be strictly in accordance with the terms and conditions and specifications laid out in the tender.
- 3.3 Any terms and conditions given by the tenderer on his own in their offers will not be binding on Balmer Lawrie.
- 3.4 The sole proprietor or authorised representative shall sign all documents that need to be uploaded. When the person signing the documents is not the sole proprietor / authorised representative of the company, the Power of Attorney authorizing such person to act and sign on behalf of the company must be scanned and uploaded and produced later on for verification by Balmer Lawrie.

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## **SCOPE OF WORK**

The scope of work shall be as per the BOQ of the price bid.

## **GENERAL TERMS AND CONDITIONS**

### **1. ELIGIBILITY CRITERIA**

The tenderers should meet the following eligibility criteria:

- I. Average annual turnover of the tenderer shall be minimum of Rs. 70 lacs during last three financial years ending 31st March, 2018. Copies of balance sheets of last three years are required to be submitted.
- II. The tenderer should have successfully executed the civil works of following minimum values during past seven (7) years ending last day of month previous to the one in which applications are invited.
  - A. 3 jobs each of value not less than Rs 7.00 lacs or
  - B. 2 jobs each of value not less than Rs 10.00 lacs or
  - C. 1 job of value not less than Rs 15.00 lacs

Copies of work order and the completion certificate are required to be submitted.

- III. Submission of EMD. MSMED/NSIC parties are exempted from payment of EMD.
- IV. Agency should have GST Registration number, copy of registration certificate is to be submitted.
- V. The agency needs to furnish self-declaration that they are not black listed by any PSU/Government Institutions.

### **2. SUBMISSION OF BIDS**

The bid is to be submitted in a single bid process i.e. Technical/ Commercial Bid with Price Bid together. In the price bid, the rates are to be submitted as per the given format and online as mentioned in the bid submission clause.

### **3. TENDER OPENING**

Unpriced and price bid will be opened as per tender calendar.

### **4. ACCEPTANCE OF OFFERS**

- (i) Balmer Lawrie reserves the right to accept any tender in whole or in part or reject any tender or all tenders or place order for any quantity, less than or more than the tendered quantity, without assigning any reason thereof.

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- (ii) Bids of any tenderer may be rejected if a conflict of interest is detected between the bidders and Balmer Lawrie at any stage.
- (iii) Balmer Lawrie is not bound to accept the lowest rate for any tender. Balmer Lawrie also reserves its right to allow Public Enterprises (Central / State) price / purchase / contract / service preference as admissible under the existing Government policy. The decision of Balmer Lawrie in this connection will be final.
- (iv) Incomplete tenders, conditional tenders, tenders received late or tender not conforming to the terms and conditions mentioned in the Tender documents or not accompanied by the requisite Earnest Money Deposit (unless exempted under the terms of this Tender) will be rejected.

## **5. NEGOTIATIONS**

- I. Balmer Lawrie reserves the right to negotiate with the Tenderer. Tenderer will have to attend the concerned office of Balmer Lawrie for negotiations/clarifications required from them, in respect of their quotations, without any commitment on the part of Balmer Lawrie.
- II. In case of negotiation, the Tenderer should send the confirmation of outcome of such negotiation in writing so as to reach the concerned office of Balmer Lawrie within 3 days from the date of negotiation/ the time stipulated. If the Tenderer fails to comply with this requirement Balmer Lawrie reserves its right to ignore their quotation at its discretion with the attendant remedies available to them.

## **6. NOTIFICATION OF AWARD**

Prior to the expiry period of Bid validity, BL will place purchase order or letter of intent on the successful bidder(s).

## **7. CONTRACT PERIOD**

The completion period is 30 days from the date of issue of LOI or P.O. whichever is earlier.

## **8. TERMINATION OF CONTRACT**

In case of any breach of contract, serious criminal act on the part of selected contractor and/or his employees, and any such acts, the Company shall have the rights to terminate the contract immediately without any notice

## **9. VALIDITY**

Offers must be valid for 120 days from the due date of the tender. The rates quoted by the tenderers once accepted by the Company shall be valid and firm during the tenure of entire contract period.

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**10. QUOTING OF RATES / TAXES**

Rate shall be quoted as per the Price Bid Format. Applicable GST shall be mentioned separately as mentioned in the attached format.

**11. EMD/SECURITY DEPOSIT**

EMD of Rs 10000/- of the successful tenderer shall be converted into Non-interest bearing Security Deposit and shall be retained till one year after successful completion of the job. EMD of unsuccessful tenderers shall be refunded after finalization of the tender.

**12. TERMS OF PAYMENT**

- a. 90% of amount along with all the tax will be released after completion of the work.
- b. 10% shall be kept as Retention Money for a period of 12 months of Defect Liability Period. The retention money can be exchanged with an equivalent amount of B.G. valid for a period of 12 months from the date of issue of completion certificate.

**13. DEFECT LIABILITY**

Defect liability period shall be one year from the date of issuance of certificate by BL after satisfactory completion of work.

**14. COMPLIANCE WITH REGULATIONS**

Vendor shall warrant that all goods and services covered by these conditions shall have been produced, sold, supplied, dispatched, delivered and furnished in strict compliance with all applicable laws, regulations, labor agreements, working conditions and technical codes and requirements as applicable from time to time. The vendor shall execute and deliver such documents as may be required to effect or to evidence such compliance.

All laws and regulations required to be incorporate in agreements of this character are hereby deemed to be incorporated by these references. Owner and their authorized representative disown any responsibility for any irregularity, contravention or infringement of any statutory regulations in the manufacture of supply of goods / services covered by this order.

**15. SUB-LETTING OF WORK**

No part of the contract or any share or interest therein shall in any manner or degree be transferred, assigned or sublet by the contractor directly or indirectly to any person, firm or corporation without the consent in writing from Balmer Lawrie. In the event of contractor contravening the conditions, Balmer Lawrie shall be entitled to get the work done from any other firm at the 'Risk & Cost' of the contract.

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## **Safety**

### **16.Safety Requirements to be followed**

#### Housekeeping

Contractors shall ensure that their work area is kept clean tidy and free from debris. The work areas must be cleaned on a daily basis. Any disposal of waste shall be done by the Contractor.

All equipment, materials and vehicles shall be stored in an orderly manner. Access to emergency equipment, exits, telephones, safety showers, eye washes, fire extinguishers, pull boxes, fire hoses, etc. shall not be blocked or disturbed

#### **Tools, Equipment and Machinery**

The Contractor must ensure that all tools & equipment provided for use during the Work is:

- suitable for its intended use;
- safe for use, maintained in a safe condition and where necessary inspected to ensure this remains the case (any inspection must be carried out by a competent person and records shall be available);
- Used only by people who have received adequate information, instruction and training to use the tool or equipment.

#### **Working at Height**

Any Work undertaken where there is a risk of fall and injury is considered to be working at height.

For any Contractor Personnel working at height, Contractors shall provide fall prevention whenever possible and fall protection only when fall prevention is not practicable. Before commencing Work in a height the Contractor must obtain from BL a Permit to Work, the Permit to Work will define the requirements to be followed. Supervisor must be present at all point of time, to ensure no deviation occur during the course of work.

#### **Fall Prevention System**

Fall prevention systems (e.g. fixed guardrails, scaffolds, elevated work platforms) must provide protection for areas with open sides, including exposed floor openings.

#### Fall Protection Systems

Where fall protection systems are used then the Contractor must ensure the following is applied:

- i. Only approved full body harness and two shock-absorbing lanyards are used,
- ii. Prior establishment of a rescue plan for the immediate rescue of an employee in the event they experience a fall while using the system,

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- iii. Anchorage points must be at waist level or higher; and capable of supporting at least the attached weight,
- iv. Lifeline systems must be approved by BL before use.
- v. Use of ISI marked industrial helmet at all point of time.

### **Scaffolding**

All scaffolds shall subject to a documented inspection by a competent person and clearly marked prior to use. The footings or anchorage for scaffolds shall be sound, rigid and capable of carrying the maximum intended load without settling or displacement. All scaffolding materials should be of MS tubular type.

Guardrails and toe-boards shall be installed on all open sides and ends of scaffold platforms. Scaffolds shall be provided with an access ladder or equivalent safe access. Contractor Personnel shall not climb or work from scaffold handrails, mid-rails or brace members.

#### **Barricades**

Floor openings, stairwells, platforms and walkways, and trenching where a person can fall any distance shall be adequately barricaded and where necessary, well lit. Where there is a risk of injury from a fall then rigid barriers must be used.

Barricades must also be used to prevent personnel entering an area where risk of injury is high e.g., during overhead work activity or electrical testing etc. Such barricading must provide clear visual warning..

#### **Environmental Requirements**

##### **Waste Management**

The Contractor is responsible to remove any waste generated by the work being done on the Site. The Contractor must dispose of the waste in line with the relevant local legislative requirements. The waste disposal route shall be documented and made available for BL to review at any time and may be subject to BL's prior approval.

Wastes (includes rinse from washing of equipment, PPE, tools, etc.) are not to be poured into sinks, drains, toilets, or storm sewers, or onto the ground. Solid or liquid wastes that are hazardous or regulated in any way are not to be disposed of in general site waste receptacles.

##### **Spills**

The Contractor is responsible for the provision of adequate spill kits/protection and the clean-up and disposal costs arising from such spills.

##### **Emissions**

The Contractor shall identify and quantify any emission sources associated with the Works. The control measures associated with these emission shall be subject to the approval of BL. Emissions include but are not limited to noise, dust, fumes, vapours

### **17.Liability & Ensuring Safety**

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The Contractor will be fully responsible for ensuring safety of lives, cargo, vehicles, property and containers within Balmer Lawrie CFS yard. Any damage to any life and/or property inside the CFS yard due to negligence/mishandling of equipment by the Operator and /or malfunctioning of the equipment would be to the account of the contractor. It is mandatory that necessary 3<sup>rd</sup> party insurance cover is kept valid by the contractor for the equipment's operating inside the CFS.

#### **18.. Safety and penalty:**

The Contractor will be penalized for any safety violation. The decision of the Safety Committee headed by Safety In charge will be final. For any safety violation viz. not using PPE as required by the nature of the job per violation Rs.1000 will be charged

#### **19.INDEMNITY & GENERAL SAFETY**

The Contractor will be required to indemnify and keep indemnified the Company against all losses and claims for injury and damage to any person or any property whatsoever which may arise out of or in consequence of the work and against all claims, demands, proceedings, damages, cost charges and expenses whatsoever that may arise against the company on account of the faults of the contractor/his workmen/due to malfunctioning of the equipment if any employed by the contractor. The company may forward the bidder any such claim demand or complaint made by any other person against the company. In such event, the contractor shall solely be liable for the disposal of the said complaint.

The contractor will be required to Indemnify and absolve the Company of all responsibilities related to employment condition of their employees and should adequately safeguard Company against any possible HR problems including those related to employment. The bidder should adhere to all State and Central Enactments related to employment such as Minimum Wages Act, Workmen Compensation Act, Provident Fund Act, Employees State Insurance Act, Gratuity Act, Bonus Act, Contract Labour [Regulations and Abolition] Act etc. Further, Company will not have any liability towards employment, remuneration or compensation in whatever manner made to the employee of the bidder. Such demand shall be settled by the bidder directly.

#### **20.FORCE MAJEURE CONDITIONS**

Delivery schedule is subject to force majeure conditions as under: If at any time during the continuance of this contract, the performance in whole or part by either party of any obligation under this contract shall be prevented or delayed by reasons of any war, hostility, acts of public enemy, civil commotion sabotage, fire ,floods, explosions, epidemics, quarantine restrictions, strikes, lock outs or acts of God (hereinafter referred as "events") provided notice of the happening of any such events is given by either party to the other

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within twenty one days from the date of occurrence thereof, neither party shall by reasons of such event, be entitled to terminate this contract nor shall either party have any claim for damages against the other in respect of such non-performance or delay in performance. Deliveries under the contract shall be resumed as soon as practicable.

## **21.ARBITRATION**

Any dispute or difference arising under this Contract shall be referred under jurisdiction of Kolkata to a sole arbitrator appointed mutually under the provisions of Arbitration and Conciliation Act, 1996 including any statutory modifications or enactment thereof shall apply to the Arbitration proceedings. The fees of the arbitrator, if any, shall be shared equally by both the parties. The award shall be a speaking award stating reason therefor and is final and binding on the parties. The proceeding shall be conducted in English language and courts at Kolkata will have exclusive jurisdiction to settle any dispute arising out of this contract.

## **22.SPECIAL INSTRUCTION**

In case of any query/clarification, the tenderer may contact our Mr. Rakesh Choudhary, Project Leader [Phone : Mobile : **9866400155**]

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**DECLARATION**

Having examined the tender documents, we have understood the terms & conditions indicated in the Tender No: *BL/LI/TCW-MUM/028* dt.03.11.2018 and hereby confirm our acceptance of the same.

Place: Signature of Tenderer

Date: Name & Address

**Seal & Signature of the Bidder**

**ANNEXURE – 1**

**PARTICULARS OF THE TENDERER’S ORGANISATION**

<b>Sr. No.</b>	<b>Description</b>	<b>Tenderers Details</b>
<b>1</b>	Name of the Tenderer	
<b>2</b>	Address of the Registered Office	
<b>3</b>	Address of the branch / office quoting against the Tender	
<b>4.</b>	Name, designation, mobile number, e-mail, Fax no. and any other details of the Contact Person	
<b>5</b>	Year of commencement of business	
<b>6</b>	Whether Sole Trader/ Partnership / Private Limited Co., or Public Limited Co. / LLP	
<b>7</b>	Registration No. (Under companies Act )	
<b>8</b>	Whether copy of Incorporation /Registration certificate from ROC(Registrar of company)	
<b>9</b>	Income Tax PAN no.	
<b>10</b>	Whether copy of PAN enclosed.	
<b>11</b>	Whether copy of latest Income Tax Return uploaded	
<b>12</b>	GST Registration. No.	
<b>13</b>	Whether copy of GST Registration certificate Uploaded	
<b>14</b>	Complete Details of the Banker, Name, Address, IFSC Code, Bank Code, Account No and Type of Account	
<b>15</b>	Whether registered under NSIC / MSME	
<b>16</b>	In case registered under NSIC / MSME, provide registration number and copy of registration	

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**ANNEXURE -2**

**GENERAL TECHNICAL REQUIREMENTS**

**REINFORCED CONCRETE AND ALLIED WORKS**

All the concrete in the works shall be controlled concrete as defined in IS: 456 unless otherwise specified.

**ALL CONCRETE WORKS SHALL BE FORM FINISH .**

The quality of material and method and contract of manufacture and transportation of all concrete work irrespective of mix, whether reinforced or otherwise shall confirm to the applicable portion of this specification.

The Engineer-in-charge/Architect/Architects representative shall have the right to inspect the sources of material/s, the layout and operation of procurement and storage of materials, the concrete batching and mixing equipment and the quality control system such as inspection shall be arranged and the Engineer-in-charge/Architect/Architects representative 's approval shall be obtained prior to starting of the work.

**B-1. CEMENT**

Unless otherwise specified or called for by the Engineer-in-charge /Architect/ Architects representatives/Owner cement shall be ordinary and/or pozolana Portland cement in 50 kg bags. Changing of brands or type of cement within the same structure or portions thereof shall be permitted only with the approval of Engineer-in-charge/ Architect/Architects representative.

A certified report altering to the conformity of the cement to IS specs by the cement manufacturer shall be furnished to Engineer-in-charge /Architect/Architects representative.

The cement shall be stored in watertight shed and in the manner that the rotation of fresh and old is taken care. The bags should be kept on a wooden pallet or runner and the stacking to be done properly to avoid collapse. It should be stored away from the sides of shed for access and precautionary measure to avoid rain water.

**B-2. AGGREGATES**

B-2.1) Aggregate in general designates both fine and coarse inert materials used in the manufacture of concrete.

B-2.2) Fine aggregate is aggregate most of which passes through 4.75 mm IS Sieve.

B-2.3) Coarse aggregate is aggregate most of which is retained on 4.75 mm IS Sieve.

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B-2.4) All fine and course aggregate proposed for use in the work shall be subject to Engineer-in-charge/Architect/Architects representative's approval.

B-2.5) Machine made/crushed sand shall be used, provided the constituent rock composition shall be sound, hard, dense, non organic, durable etc.

**B-3. WATER:**

B-3.1 Water used for both mixing and curing shall be free from injurious amount and deleterious materials.

B-3.2 The suitability of water for making concrete shall be ascertained by the compressive strength and initial setting time test specified in IS 456.

B-3.3 The PH value of water shall generally be not less than 6.0

**B-4. REINFORCEMENT:**

B-4.1. M.S/Tor steel shall conform to the relevant latest IS code of practice. The steel brought on site shall be got tested (at approved laboratory at the contractors cost before using on site).

**B-4.2 Storage:**

The reinforcement shall not be kept in direct contact with the ground but stacked on top of an arrangement of timber sleepers or the like. Bars of different classification size and length should be stored separately.

If the reinforcing rods have to be stored for a long duration, they shall be coated with cement wash before stacking and/or be kept under cover or stored as directed by the Architect/Architects representative. Fabricated reinforcement shall be carefully stored to prevent damage, distortion, corrosion and deterioration.

**B-5. CONCRETE GRADE**

Concrete grade shall be as designated on drawings. In concrete grade M15, M20, M25 etc. the number represents the specified characteristic compressive strength of 150 mm cube at 28 days, expressed in N/sq. mm as per IS:456.

**B-6. DESIGN MIX CONCRETE:**

It shall be contractor's sole responsibility to carry out the mix designs at his own cost. He shall furnish to Architect/Architects representatives at least 10 days before concreting operations, a statement of proportions proposed to be used for the various concrete mixes and the strength results obtained. Trial mixes shall be designed in accordance with IS 10262 "Recommended guidelines for concrete mix design". The compliance of a designed mix for structural concrete shall be judged by the strength of the hardened concrete in comparison with the specified characteristic strengths. The strength requirements of the concrete mixes ascertained on 150 mm cubes as per IS: 516 shall comply with the requirements of IS: 456. Minimum compressive strength for the various grades of concrete are as specified under:

<b>Grade of Concrete</b>	<b>Min. compressive strength after 7 days in N/sq. m</b>	<b>Min. compressive strength after 28 days in N/sq. mm</b>
M20	13.5	20.0
M25	17.0	25.0
M30	20.0	30.0
M35	24.0	35.0

Conversion to volumetric proportion

Contractor should use weigh batcher for site mixing or concrete from batch type RMC is only allowed. No volume batching is allowed.

#### B-7. BATCHING OF CONCRETE:

In proportioning concrete, the concrete of both cement and aggregate shall be determined by weight. In case uniformity of aggregate has been established over a period of time, and where weigh batching is not practicable, the quality of fine and coarse aggregate (not cement) may be determined by volume if permitted by the Engineer. If fine aggregate is moist and volume batching is adopted, allowance shall be made for bulking in accordance with IS 2386( part 111).

The water cement ratio shall be maintained constant at its correct value. To this end, determination of moisture content in both fine and coarse aggregate shall be made by the contractor at no extra cost. The frequency of tests shall be determined by the Engineer-in-charge according to weather conditions. The Architect's representative may request test whenever he feels the correct moment. The contractor has to fulfill the request immediately at his own costs.

#### B-8. TESTING

##### B-8.1. Slump Test.

Slump tests shall be carried out as often as demanded by the Engineer-in-charge/Architect/Architects representative and invariably from the same batch of concrete from which the test cubes are made. Slump tests shall be done immediately after sampling.

##### B-8.2. Concrete Cube and other Ingredient Testing.

All testing shall be done as per approved field quality plan. The field quality plan shall be prepared in line with IS: 456. Contractor shall produce the test results of the cubes in time and shall maintain proper record of it.

#### B-9. NOMINAL MIX CONCRETE:

No mix design or preliminary tests are necessary for Nominal Mix Concrete. Nominal Mix Design shall be restricted to works of minor nature in which the strength of concrete is not critical as decided by the Engineer-in-charge/Architect/Architects representative. Proportions for Nominal Mix Concrete shall be in accordance with IS 456.

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#### B-10. MIXING OF CONCRETE:

Concrete shall be mixed in a mechanical mixer. The mixer shall comply with IS 1791. The mixing shall be continued until there is uniform distribution of the materials and the mass is uniform in colour and consistency. If there is segregation after unloading from the mixer, the concrete shall be remixed. For guidance, the mixing time may be 1 ½ to 2 minutes.

Workability of the concrete shall be controlled by direct measurement of water content. Workability shall be checked at frequent intervals (See IS 1199).

#### B-11. CONSTRUCTION JOINTS

Construction joints shall be properly planned and shall be as per the Engineer-in-charge / Architect / Architects representative's instructions. They shall be made at right angles to the member, and shall be made against firm stop boards. The stop boards shall be removed as soon as possible after placing the concrete. The concrete shall be well brushed off with steel brush and be provided with a key for next lift. Before the next lift is over the joint shall be well scrubbed to remove all loose materials.

#### B-12. FORM WORK

All form work for RCC water retaining structures shall be either new waterproof plywood or new steel plates only. After each use form work should be thoroughly cleaned, checked for accuracy and approved by Architects representative for further repetition for work. Damaged formwork shall not be used. All the concrete of grade M20 and above shall be fair face concrete. Extra care shall be taken to ensure proper cover to the reinforcement. Readymade plastic cover moulds or mortar cubes shall be used for all concrete work. A smooth finish shall be obtained with the use of lined or plywood forms having smoothed and even surfaces. In case after removal of the forms, joint marks, blemishes, projections etc. are visible, it is Architects representative's decision to request the removal of concrete elements at contractors cost or to take further decision like, e.g. joint marks shall be smoothed off, and all blemishes, projections etc. shall be removed properly leaving the surface smooth.

#### B-13. DESIGN OF FORMWORK

The design and engineering of form work as well as its construction shall be the responsibility of contractor. If so instructed, the drawings and/or calculations for the design of form work shall be submitted to the Architect /Architects representatives for their approval at no extra cost. Architect / Architects representative's approval however, shall not relieve the contractor of the full responsibility of the design and construction of form work. The formwork shall be designed and constructed to the shapes, lines and dimensions shown on the drawings within tolerances given below:

B-13.1 Deviation from specified dimensions of cross section of column and beams. –6mm +12mm.

B-13.2 Deviation from dimensions of footings:

Dimension in plan:- 6mm +12mm

Eccentricity: 0.02 times the width of the footing in the Direction of deviation but not more than 50mm.

Thickness: +/- 0.05 times the specified thickness.

Note: the above tolerances apply to concrete dimensions only, not to positioning of vertical reinforcing steel or dowels.

The formwork shall be capable of being dismantled and removed from the cast concrete without shock, disturbance or damage. The arrangement shall be such that the soffit forms properly supported on props can be retained in position for such period as may be required by maturing conditions or specifications.

#### B-14. RCC WORKS

Rates for all R.C.C. work are deemed to be inclusive of drip moulds at soffit as per design given by the Architect, wherever necessary, even if they are not expressly specified or shown on drawings. The rates of R.C.C. chajjas, canopies, parapets, retaining walls etc. include rainwater disposal arrangement by 25mm G.I. pipe spouts as directed by the Architect. Any extra concrete, laid to adjust slopes for drainage, is to be paid in cubic meter basis as the rate for plain concrete work for templates etc. In case, tenders are invited involving R.C.C. work with rates for R.C.C. work inclusive of steel and only typical R.C.C. details are given, it should be noted that proportion of steel may vary for individual members. The tendered rates for R.C.C. work will hold good, even if the proportion of steel to concrete work varies for individual members, provided that over-all percentage of steel does not vary more than +/- 5 % of steel content.

#### B-15. TOLERANCES IN CONCRETE WORK

Tolerance is a specified permissible variation from lines, grade or dimensions given in drawings. No tolerances specified for horizontal or vertical building lines or footings shall be constructed to permit encroachment beyond the legal boundaries. Unless otherwise specified, the following tolerances shall be permitted:

##### B-15.1. Variation from plumb

B-15.1.1. 5 mm per 2.5 m or 25mm whichever is less.

B-15.1.2. For exposed corner columns and other conspicuous lines in any bay or

5 m maximum length/height	5 mm
in 10 m or more length/height	10 mm

B-15.2) Variation from the level or from the grades indicated on the drawings.

B-15.2.1) In slab soffits, ceilings, beam soffit, and in arises

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In 2.5 m	5 mm
In any bay or 5 m maximum	8 mm
In 10 m or more	15 mm

15.2.2) For exposed lintels, sills, parapets, horizontal grooves, and other conspicuous lines:

in any bay or 5 m maximum	5 mm
in 10 m or more	10 mm

15.3) Variation from the linear building lines from established position in plan and related position of columns, wall and partitions:

in any bay or 5 m maximum	10 mm
in 10 m or more	20 mm

15.4) Variation in the sizes and locations of sleeves, openings in walls and floors: 5 mm except in the case of and for anchor bolts.

15.5) Variation in cross-sectional dimensions of columns and beams and in the thickness of walls:

Minus	5 mm
Plus	10 mm

15.6) Footings

15.6.1) Variation in dimension in plan	
Minus	5 mm
Plus	50 mm

15.6.2) Misplacement or eccentricity: 2% of footing width in the direction of misplacement but not more than 50 mm

15.6.3) Reduction in thickness: Minus - 5% of specified thickness subject to a maximum of 50 mm

15.7) Variations in steps

15.7.1) In the flight of stairs	
Rise	3 mm
Tread	5 mm
15.7.2) In consecutive steps	
Rise	1.5 mm
Tread	3 mm

Tolerances in other types of structures shall generally conform to those given in Clause 2.4 of Recommended Practice for Concrete Form work (ACI 347).

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15.8. Tolerances in fixing anchor bolts shall be as follows:

15.8.1 Anchor bolts without sleeves plan	(+/-) 1.5 mm in all directions.
15.8.2) Anchor bolts with sleeves Elev.	(+/-) 5.0 mm in all directions.
15.8.3) For bolts upto & including 28mm dia.	(+/-) 5 mm in all directions.
15.8.4) For bolts 32 mm and above	(+/-) 3 mm in all directions.
15.8.5) Embedded parts	(+/-) 5 mm in all directions.

**B-16. RCC Precast Slab/Covers:** The frame of trench cover shall be firmly embedded to correct alignment and levels in R.C.C. slab of 100 mm thick in concrete M30 with reinforcement as per approved drawing.

B16.1 Precast Concrete Trench Covers & Frames: Precast reinforced cement concrete covers intended for use in trenches and water works shall generally conform to IS : 12592 (Part 1 & 2) 1991.

Detailed specifications are as under:

1. Grades : Types & Uses

Covers and frames shall be of the following four grades and types:

- Designation Type/ shape of cover
- Light Duty LD-2.5 Rectangular, Square, Circular
- Medium Duty MD-10 Rectangular, Circular
- Heavy Duty HD-20 Circular-Square, Rectangular,
- Extra Heavy Duty EHD – 35 Circular, Square, Rectangular,

2. The different grades and types of covers may be used as follows and as directed by Architect/Architects Representative/Engineer-in-Charge:

a) LD-2.5 Rectangular, Square or Circular Types: These are suitable for use within residential and institutional complexes/area with pedestrian but occasional LMV traffic. These covers may also be used for Inspection chambers.

b) MD-10: These are suitable for use in service lanes/roads, car parking areas etc.

c) HD-20: Suitable for use in institutional/commercial areas/carriage ways with heavy-duty vehicular traffic like buses, trucks, etc.

d) EHD-35: Circular, square, or rectangular (scrapper ) types: These are suitable for use on carriage way in commercial/ industrial/port areas/near warehouses/ godowns where frequent loading and unloading of trucks/trailers are common, with slow to fast moving vehicular traffic of the types having wheel loads upto 11.5 tones, irrespective of the location of the chambers.

3. Materials:

Cement: Cement used for manufacture of pre-cast concrete trench covers shall be 43 grade Ordinary Portland cement conforming IS: 8112-1989.

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**Aggregates:** The aggregates used shall be clean and free from deleterious and organic matter and shall conform to the requirements of IS: 383- 1970. The aggregates shall be well graded and the nominal maximum size of coarse aggregate shall not exceed 20 mm.

**Concrete:** The contractor shall determine the mix proportions such that it will produce dense concrete without voids, honey combing etc. The minimum cement content in the concrete shall be 460 kg/m<sup>3</sup> with a maximum water cement ratio of 0.45. Concrete weaker than grade M-30 (design mix) shall not be used. Compaction of concrete shall be done by machine vibration only.

**Reinforcement:** The reinforcement steel shall conform to IS: 1786-1985 as specified. Reinforcement shall be clean and free from loose mills scale, loose rust, and mud, oil, grease or any other coating, which may reduce or destroy the bond between the concrete and steel. A light film or rust may not be regarded as harmful but steel shall not be visibly pitted by rust. In addition, wire pieces shall be used as on additional reinforcement.

#### 4. Shapes and Dimensions:

**Shapes:** The shapes of precast concrete covers shall be square, rectangular or circular as specified.

**Dimensions:** Dimensions of Precast concrete trench covers shall be as given in Table, the minimum clearance at top between the frame and cover shall be 5 mm.

Precast covers are designed and provided with MS rims of 2.5 mm thickness welded around with provision of two lifting books welded at appropriate locations.

5. Chequered pattern on operative surface. The MS Rims along with the edges of precast covers and their operative surface are suitably coated/finished using corrosion resistant paint.

#### 6. Performance requirements

##### Test Load

When tested for ULTIMATE breaking load using 300 mm diameter block as per the method described in IS:1292 (part-I) covers shall be within the following range:

Light-duty (LD) - 2.5 tones, Medium duty (MD) – 10 tones, Heavy Duty (HD) – 20 tones, Extra Heavy Duty (EHD) – 35 tones

7. Lifting Device: The minimum diameter of mild steel rod used as lifting device shall be 10 mm for light and 12 mm for medium duty covers and 16 mm for heavy and extra heavy-duty covers. The lifting device shall be protected from corrosion by galvanizing or epoxy coating or any other suitable method as directed by Architect/Architects Representative/Engineer-in-Charge.

8. Finishing & Coating: To prevent any possible damage from corrosion of steel the underside of the covers shall be treated with anticorrosive paint. The top surface of the covers shall be given a chequered finish. In order to protect the edges of the covers from possible damage at the time of lifting and handing it is necessary that the covers shall be cast with a protective mild steel sheet of minimum 2.5 mm thickness around the periphery of the covers. Exposed surface of mild steel sheet shall be given suitable treatment with anticorrosive paint or coating.

#### 9. Physical Requirements:

a) General: All units shall be sound and free from cracks and other defects, which interface with the proper placing of the unit or impair the strength or performance of the units. Minor chipping at the edge/surface resulting from the customary methods of handling during delivery shall be deemed for rejection.

b) Load Test: The breaking load of individual units when tested in accordance with the method described in IS: 12595-1991 shall not be less than the values specified in Table:

Grade of cover	Type Load (tones)	Diameter of Block (mm)
EHD	35 Circular, Square or Rectangular	300
HD	20 Circular, Square or Rectangular	300
MD	10 Circular or Rectangular	300
LD	2.5 Circular, Square or Rectangular	300

**10. Fixing:**

The frames of trenches shall be firmly embedded to correct alignment and level in RCC slab on the top of masonry which shall not be paid as extra unless specified otherwise.

**11. Item to Include:**

The item includes all labour, material, tools and equipment, to construct the cover as per the approved drawing and the above specifications, including curing, making, etc. complete. All incidental works are included in the item.

**12. Mode of Measurement and Payment:**

The measurement shall be recorded in number of covers of specified dimensions, constructed as per above specifications. The contract rate shall be per number of specified dimensions and include the cost of materials and labour involved in all the operations.

**STRUCTURAL STEEL WORKS –**

**D-1. INDIAN STANDARD CODES**

Unless otherwise specified herein, materials and workmanship or the work shall conform to the latest editions of the following standards or their approved equivalents.

D-1.1 Indian Code of Practice for General Construction in steel, Indian Standard Institute IS: 800.

D-1.2 Code of Practice Use of Metal Arc Welding for General Construction in Mild Steel, Indian Standard Institute IS 816.

D-1.3 Specification for Structural Steel IS: 226 and when specified IS 2062.

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D-1.4 Specification for Black Hexagonal Bolts and Nuts IS 1363.

D-1.5 Specification for Precision and Semi-precision Hexagonal Bolts and Nuts IS 1364.

D-1.6 Specification for covered Electrodes for Metal and Welding of Mild Steel IS : 8114.

**D-2. FABRICATION:-**

All structural steel work shall be in accordance with IS : 800 All materials shall be finished straight and shall be machined true and square where so specified material at the fabrication shop shall be kept clean and protected from weather. All holes and edges shall be free from burrs. Shearing and chipping shall be neatly and accurately done and all portions of work exposed to view shall be neatly finished.

**D-3. STRAIGHTENING:-**

All steel materials, before being worked shall be straight and free from bends or twists. If the sections are distorted or twisted they shall be straightened and flattened by methods that will not injure the material. (Heating and forging is not allowed). Contractor's lumps price shall be inclusive of the cost of all these operations involved in straightening as stated above.

**D-4. CUTTING AND EDGE PLANEING: -**

Cutting may be done by shearing, cropping, sawing, or mechanically controlled gas cutting torch as permitted by the Architect/Architects Representative/Engineer-in-charge. All re-entrant corners shall be shaped notch free to a radius of at least 12mm. Sheared or cropped edges shall be dressed to a neat finish and shall be free from distortion and burrs. Hand frame cutting shall be undertaken only if so permitted by the Engineer-in-charge and shall only be carried out by an expert in such work. Hand frame cut edges shall be ground smooth and straight Edge planning of sheared edge is not intended unless the sheared edges are such as to warrant it or specifically called for, by Engineer-in-charge whose decision shall be final and binding. Edges of cropped or gas cut edges shall be planned as directed by Engineer-in-charge.

**D-5. Grinding:-**

All the edges cut by flames shall be grounded before these are welded. Ends of all bearing stiffeners shall be ground to fit tightly at both top and bottom. In case of gantry girders, the bottom of the knife-edge support shall be accurately ground to provide effective bearing on the column bracket with a clearance not exceeding 0.1 mm locally at any place. The top surface of column bracket, struts and compression members shall be accurately ground and closely butted over the whole section with tolerance not exceeding 0.1 mm locally at any place. Notwithstanding the above full loads shall be transferred through welds. Column ends resting on bases shall be ground smooth and true to ensure minimum 85 % contact area with local gap not exceeding 0.1 mm.

The base plate shall be similarly ground over the bearing surfaces and shall have effective contact with the end of the shaft. The bearing face which is to be grouted direct to a foundation need not be ground if such face is true and parallel to the upper face. To facilitate grouting and escape of air

holes shall be provided wherever necessary in column bases.

**D-6. Bending:-**

The bending of plates and sections to specially required shapes shall be done either on appropriate machine or by angles smithy and black smithy process.

**D-7. Rolling and framing:-**

Plates for chutes, hoppers etc shall be accurately laid off and rolled or formed to required profile shape as called for on the drawings. Adjacent sections shall be matched for facilitating accurate assembly, welding and erection in the field.

**D-8. Drilling and Punching:-**

Holes through more than one thickness of material for members such as compound stanchion and girders flanges shall, where possible, be drilled after the members are assembled and tightly clamped or bolted together sub punching may be permitted, by assembly provided the holes are punched 3 mm less in diameter than the required size and reamed after assembly to the full size. Punching shall not be adopted where the thickness of the materials to be punched together exceeds 16 mm.

Matching holes for black bolts shall register with each other so that a gauge of 1.0 mm lesser in diameter than the diameter of the hole will pass freely through the assembled members in a direction right angle to such members. Finished holes shall not be more than 1.5 mm or 2.0 mm (as the case may be depending upon the diameter of the bolt is less than or more than 25mm) larger in diameter than the diameter on the black bolt passing through them. Unless otherwise specified by the Engineer-in-charge.

Holes for bolts shall not be formed by gas cutting process.

Where reamed members are taken apart for shipping or handling the respective pieces reamed together shall also be marked that they may be re-assembled in the final setting up. No interchange of reamed parts will be permitted. Poor matching, over drilling and ovality in holes shall be a cause for rejection.

Burrs shall be removed after drilling holes, there ever horizontal member is likely to collect water, and suitable holes for drainage shall be provided.

**D-9. Notches:-**

The ends of all joints, beams and girders shall be cut truly square unless required otherwise and joint flanges shall be neatly cut away or notched away wherever necessary, the notches being kept as small as possible. Corners of such notches in flanges shall be shaped to a radius of 50 mm.

**D-10. Assembly:-**

The component parts shall assembled in such a manner that they are neither twisted nor otherwise damaged and shall be so prepared that the specified chamfer, if any is provided. In order to minimize distortion in a member, the component parts shall be positioned by clamps, jigs and other suitable means and fasteners. If the individual components are to be bolted, parallels and tapered drifts shall be used to align the parts so that the bolts can be accurately positioned. Items like roof trusses etc.

shall be assembled keeping in view the actual site conditions, prior to dispatch to site of erection, so that they can conveniently pre-assembled during erection. Necessary match marks shall be made on these components before disassembling in the shop and dispatching.

**D-11. Connections:-**

The contractor shall plan out the work right from the preparation of fabrication drawings stage to have shop connections as well as field connections effected either by welding, or by black bolts as shown on the design / fabrication drawings or as specified.

**D-12. Bolted Connections:-**

Bolts, nuts and washers and other fastening material shall be stored in racks off the ground with coating of suitable protective oil.

Bolts shall be inserted in such a way that they may remain in position under gravity even before fixing the nut.

The length of the bolt shall be such that at least one thread of the bolt projects beyond nut. Bolted parts shall fit solidly together when assembled and shall not be separated by gaskets or any other interposed compressible materials. When assembled, all joint surfaces including those adjacent to the washers shall be free of scales except tight mill scales. They shall be free of dirt, loose scales, burrs and other defects that would prevent solid seating of the parts. Contact surface shall be free of oil, paint, lacquer or galvanizing. Wherever necessary tapered washers or flat washers or spring washers shall be used under the nut so that no part of the threaded portion of the bolt is within the thickness of the parts bolted together.

Flat washers shall be circular of a diameter two and a half (2-1/2) times that of bolt and of suitable thickness. Where bolts head/nuts bear upon the be-leveled surfaces they shall be provided with square tapered washers of suitable thickness to afford a seating square with the axis of the bolt. Flat washers shall be circular. All the bolts and nuts shall be of steel with well-formed hexagonal heads unless specified otherwise, forged from the solid and shall be dipped in hot linseed oil as soon as they are made.

Notwithstanding anything to the contrary contained in IS: 1363, IS: 1364, and IS: 1367, the unthreaded length of the bolt shall be equal to total thickness of metal being bolted together plus 2 mm. The threaded length shall be equal to at least the diameter of the bolt plus 6mm. Not more than one shop splice shall be provided to make up the full length of member. This splice shall be within full strength butt weld.

**D-13. Welded Connections:-**

Manual arc welding shall be used, except in case of continuous welds, use of automatic welding machine shall be necessary for ensuring satisfactory quality of fabrication. Welding must be done by experienced and tested welders in proper sequence using necessary jigs and fixtures.

Welding shall be done by experts in the field who have been qualified by tests as specified in this specification. Surfaces to be welded shall be free from loose scales, slag, rust, grease, paint and any other foreign materials.

The members to be joined by fillet welding shall be brought and held as close together as possible

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and in no event shall be separated by more than 3mm. If the separation is 1.5 mm or greater, the fillet weld size shall be increased by the amount of separation. This shall only apply if the surfaces are completely sealed by welds.

Before commencing fabrication of members in which welding is likely to result in distortion or locked up stresses a complete program of fabrication, assembly and welding shall be made and submitted to the Engineer for approval.

Web to flange connections shall be welded by continuous double fillet welds by automatic or semi-automatic electric arc welding process. All welds shall be free from defects like blow-holes, lack of penetration, slag and inclusions etc. All fillet welds shall be inspected for flaws. Butt welding in flange plates or web plates shall be complete before the flanges and webs are welded together. All main butt welds shall have complete penetration unless noted otherwise.

The contractor shall give timely notice to the engineer-in-charge before welding is taken up at the site. Approval of engineer-in-charge shall be undertaken in written before welding field connections.

#### D-14. Electrodes:-

The electrodes used for welding shall be of suitable type and size depending upon the specifications of the parent material, the method of welding, the position of the welding and the quality of welds, desired e.g. normal penetration welds or deep penetration welds and shall conform to IS : 814, IS : 1395 or IS: 1442 ( latest edition ) as per requirements.

Only those electrode which give radiographic quality welds shall be used. Suitable electrodes of Advani Oerlikon, Indian Oxygen or Philips or any approved make shall be used for the work. Specific approval of the Architect/Architects representative/Engineer-in-charge shall be taken by the contractor for the various electrodes proposed to be used on the work before any welding is started.

Were bare electrodes are used these shall correspond in specification to the parent material. The flux used for submerged arc welding should be specifically manufactured for the purposes and should have such a composition which does not evolve any appreciable quantity of gases. The electrodes shall be stored in an oven strictly in accordance with the manufacturer's requirements as stipulated.

#### D-15. Welding:-

No welding shall be done when the surface of the member is wet, galvanized or painted, nor during high winds unless the welding operator and the work are properly protected.

All welds shall be free from defects like blow holes slag inclusion, lack of penetration, under cutting, cracks etc. All welds shall be cleaned of slag or flux and show uniform sections, smoothness of weld metal, feather edges without overlap, freedom from porosity. The ends of the welds shall have full throat thickness. This shall be obtained on all main welds by the use of extension pieces adequately secured on either side of the main plates. Additional metal remaining after the removal of extension pieces shall be removed by matching or by other approved means and the ends and surface of the welds shall be smoothly finished.

The sequence of welding shall be carefully chosen to ensure that the components assembled by welding are free from distortion and large residual stresses are not developed. The distortion should be effectively controlled either by a counter effect or by counter distortion. The direction of welding should be away from the point of restraint and towards the point of maximum freedom

Each case shall be carefully studied before finally following a particular sequence of the welding.

Butt welds in flange plates and or web plates shall be completed before the flange and webs are welded together.

The beams and columns stiffeners shall preferably be welded to the webs before the webs and flanges are assembled, unless the web and flanges of the beam or column are assembled by automatic welding process.

Approval of welding sequence and the procedure shall not relieve the contractor of the responsibility for the correct welding and for minimizing the distortion in the finished structure which in no case shall exceed that laid down in Indian Standard.

All the welds shall be furnished full and made with correct number of runs, the welds being kept free from slag and other inclusion, all adhering slag being removed from exposed faces immediately after such run welding procedure, current voltage etc. shall be as per electrodes manufacturer's instructions.

All main butt welds shall have complete penetration and except where it is impracticable they shall be welded from both side. Back surface of the weld should be gauged and cleaned before first run of the weld is given from back to back.

Butt welds shall be terminated at the end of joint in a manner that will ensure soundness. Where abutting parts 20mm or more in thickness run on and run off plates with similar edge preparation and having a width not less than the thickness of the thicker part jointed shall be used. These extension pieces shall be removed upon completion of the weld and the ends of the welds made smooth and flush with the abutting parts by machining or by other approved means. Where the abutting parts are thinner than 20mm the extension pieces may be omitted but the ends of the butt welds shall then be chipped or gouged out to sound metal and side welded to fill up the ends to the required reinforcement.

#### D-16. Inspection and Testing:

The contractor provides at his cost all testing and inspection services and facilities to the engineer-in-charge. The cost of these tests shall be borne by the contractor. The contractor shall also give sufficient advance notice to the engineer-in-charge for inspection of materials or workmanship. The material rejected on inspection shall be promptly removed and replaced by materials approved by the engineer-in-charge.

The acceptance of test certificates or shop inspection by engineer does not relieve the contractor from the responsibility of providing materials conforming to specification requirements nor does it invalidate final rejection at the site by the engineer-in-charge unless otherwise stated. At all stages of fabrication and assembly, the structural steel members shall be inspected to check whether the dimensions, tolerances, alignment, painting and surface finish are within areas specified. The same standard of supervision and quality control as for shop work shall be maintained for field fabrication work inspection and tests on structural steel members shall be carried out as follows:-

**D-17. Inspection of Welds:-**

The contractor shall in routine check execution of established technological processes or general technological instructions. All welds shall be visually examined and measured for external dimensions by appropriate gauges. Profile of the weld shall be informed. In case of butt and corner welds the profile shall be convex and in case of submerge are fillet weld it shall be slightly concave. He shall also conduct selective examination of welds by ultrasonic and radiographic method.

The numbers of these tests are specified in Clause 6.03. However, welded joints in doubt examined by ultrasonic method would be re-examined by x-ray although this may be beyond the number of such tests specified. The contractor shall arrange for examination by ultrasonic, radiographic for welded joints for high quality control and in areas of doubtful welding as directed by engineer-in-charge.

**D-18. Quantum of Tests:-**

Visual examination	Hundred percent (100 %) of welded joints.
Dye penetration test	As and when directed by the
Ultrasonic	Hundred percent for butt welds.

**D-19. Rectification of Defective Welding Work:-**

Whenever defects like improper penetration, presence of blow holes, under cuts, cracking, and slag inclusion are noticed, the welds in such location shall be removed by gauging process. The joints shall be prepared again by cleaning the burrs and residual matters with the wire brushes and grinding, if necessary and re welded. The gauging shall be done using gouging electrodes. All defects shall be rectified, at no extra cost as per direction of the engineer-in-charge and tests shall be conducted again for such cases.

**D-20. Acceptance of Welded Structures:-**

The acceptance of the welded work shall depend upon correct dimensions and alignment, absence of distortion in structure, satisfactory results from the examination and testing of the joints and the test specimens as per IS soundness of weld and upon general workmanship being good. Decision of engineer-in-charge shall be final and binding.

**D-21. Tolerance:-**

The dimensional and weight tolerance for rolled shapes supplied by the contractor shall be in accordance with IS: 1852 and / or ASTM A6.

No rolled or fabricated members shall deviate from straightness by more than 1 / 1000 of the axial length or 10mm whichever is smaller. The length of members with both ends finished for contact shall have a tolerance of (+) or 9-0 mm.

Members without ends finished for contact bearing shall have a tolerance of (+) or (-) 1.5 mm for

members length and a tolerance of (+) or (-) 3mm for members over 10 meters in length.

Lateral deviation between centre line of web plate and centre line of flange plate at contact surface in the case of built up sections shall not exceed 3mm. The combined warping and tilt of flanges in welded built up section shall not exceed 1/200th of the flange width or 3mm whichever is smaller.

The deviation from flatness of welded plate girder web in the length between stiffeners or a length equal to the depth of the girder shall not exceed 1 1/50th of such length.

Deviations from the specified depth of welded girders measured at the centre line of the web shall not exceed (+) or (-) 3mm upto a depth of 1000mm, (+) or (-) 5mm for depths above 1000mm and upto 2000 mm and (+) 18 mm and (-) 5mm for depths over 2000 mm.

#### D-22. Shop Matching:-

Some steel work , particularly columns, along with the tie beams / bracings, roof trusses etc. may have to be shop assembled to ensure satisfactory fabrication, obtaining of adequate bearing, areas etc., if so desired by the engineer at no extra cost to the purchaser.

#### D-23. Marking of Members:-

23.1. Before any steel work leaves the contractor's fabrication it shall be suitably marked in accordance with the approved drawings.

23.2. The erection marks assigned to various components of the structural steel work excepting cross-beams shall also contain an erection sequence number indicating the sequence in which the various components are to be erected.

23.3. Erection marks shall be clearly painted on the work, each piece being marked in at least two places. Each piece shall also have its weight marked thereon.

23.4. The centre line of all column bases and girder hearings and important levels shall be marked on the sections with the utmost care to ensure proper alignment and assembly of the pieces at the site.

23.5. A separate column code should be adopted for parts (if any ) fabricated out steel supplied by the contractor . Weight of these parts shall also be marked.

#### D-24. Drilling holes for other works:-

Holes in members (included in this scope) required for installing equipment or structures fabricated by other contractor shall be drilled by the contractor. Effort shall be made to supply information for these holes by Architect/Architects representatives / engineer-in-charge before fabrication. However these may be required to be drilled even after erection.

#### D-25. Shop painting:-

After all inspections and tests have been conducted to the satisfaction of the Architect/ Architects representatives/Engineer-in-charge, the steel surface to be painted or otherwise treated, shall be dried and thoroughly cleaned as per IS : 1477 part I. All steel work shall be given one (1) coat of

approved metal protection except where encased in concrete. The metal protection of approved shade and of Asian/ICI/Jenson Nicholson or Shalimar Paints shall be used for the work.

Surfaces not in contact but in accessible after shop assembly shall receive two (2) different coats of shop paint. Surfaces to be welded shall not be painted or metal coated, within 50mm of the edge where welding is to be done since this may impair the quality of weld. Machined edges and contact surfaces shall be cleaned effectively but not painted. Machine finished edges shall be protected against corrosion by a suitable coating.

Red oxide shall be used for shop painting with primer applied by brushing. The instructions of the manufacturers shall be followed in applying the paint.

**D-26. Erection:-**

The contractor shall complete all preliminary works at site like transporting fabricated materials, derricks, unloading gantry etc. so as to start erection work as per schedule. The contractor shall furnish at its' own cost necessary inflammable staging and hoisting materials or equipment for erection work. The contractor shall also provide necessary passage ways, fences, safety belts, helmets, lights and other fittings to the engineer's satisfaction.

All assembling shall be carried out on a level platform. No dragging of steel shall be permitted.

The contractor shall ascertain the correctness of the foundations and carry in cleaning of foundation at his own cost. Welding shall be done in accordance with IS: 816. Code of practice for use of metal are welding for general construction on mild steel and IS : 823 code of procedure for manual arc welding of mild steel. The contractor shall work in co-ordination with the other agencies at site. The engineer shall have free access to inspect any part of the work, during erection and all erection shall be subject to his approval. In case of faulty erection all such dismantling and re-erection required will be at contractor's cost.

No paint shall be applied to field welds or bolts until these have been approved by the engineer-in-charge.

No welding or final bolting shall be done until the structures have been properly aligned and has the approval of the engineer-in-charge.

The contractor shall examine the site conditions and transportation clearances before deciding whether the building columns are to be fabricated in one piece or more than one piece. Maximum number of erection joints permitted in column shall be two i.e., no column shall be fabricated and erected in more than 3 pieces. Proper splice material shall be provided at the erection joints and as indicated in fabrication drawings. When erection joints are provided in column, their location shall invariably be above floor level and will be as per approval of the engineer-in-charge.

Nothing extra shall be payable for fabrication / erecting columns in one piece or more than one piece. The splice material shall however, be detailed in the fabrication drawings and shall be part of supply, fabrication and erection of structural steel.

**D-27. Tolerance for erection:-**



The tolerance limits during erection shall be as follows:-

- The shift of column base from the marked axis shall not exceed 5mm.
- All column tiers shall be plumb within a tolerance of 1 in 500 and the structure as a whole plumb within a tolerance or 1 in 1000.
- The displacement from plumb of a note that the deviations given elsewhere other than in the format as mentioned above shall be Null & Void (not acceptable) and all the conditions of the tender except for which the deviation column tiers shall not exceed 10mm and the total displacement of the structure as a whole should not exceed 25 mm for structures upto 50m an additional displacement of 1 mm for every 2.5 m additional height shall be permitted subject to maximum displacement of 50mm.

The actual levels of supports of trusses roller beams, roofing beams, purlins etc. shall not vary by more than 20mm from their marked levels.

The sweep of trusses, beams etc. in the horizontal plane shall not exceed 1 / 1500 of their span subject to a maximum of 10 mm.

The deviation of the upper chord of trusses from vertical plane through centers of supports shall be within 1 / 250th of the truss height. Deviation in spacing of purlins shall be within 5 mm.

D-28. Stability:-

28.1. The contractor shall be responsible for the stability at all stages of its erection at site and shall take all, necessary measures by the additions of temporary bracings and guying to ensure adequate resistance to wind and also to loads due to erection equipment and their operation. Guying and bracing shall be done in such a way that it does not interfere with the movement of working of other agencies working in the area. For the purpose of guying the contractor

28.2. Shall not use the structures which are likely to be damaged by the guy. Any damage caused by the contractor shall be rectified by him entirely at his own cost to the satisfaction of the purchaser / engineer-in-charge.

28.3. The lump sum supply, fabrication and erection of structural steel work shall include provision of such temporary bracings and their removal. Such temporary bracings used shall be the property of the contractor and may be removed by him at the end of the job from the site of work.

28.4. If work has to be carried out adjacent to switchyards or electrical installations which are live. Contractor must ensure suitable safety precautions in consultations with the engineer-in-charge.

28.5. If a portion of the work or project area cannot be made available to contractor for his activities due to operations being carried out by other contractors, he shall suitably modify his sequence of operations as to continue work without interruption.

29. Defective work:-

Any error in work which prevents proper assembling and fitting of parts in the field by moderate use of drift pins or moderate amount of remaining shall be classified by engineer-in-charge as defective work. No gas cutting or punching of holes shall be permitted for erection.

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All defective work shall be replaced / rectified as the case may be by the contractor at his own cost. Any charges incurred by purchaser either directly or indirectly because of defective workmanship will be deducted from the amount due to contractor before payment is made.

**D-30. Grouting:-**

Fresh Conbextra- GP 2 or equivalent make shall be used for grouting of column bases and foundation bolts in pockets and block outs provided in foundation by other contractor. Contractor shall be responsible for bringing the top of concrete foundation to the desired level by chipping. In case the foundation is cast at lower than the desired level, the contractor make up the difference by providing additional height without extra payment for any such work or material. Top surface of foundation shall be chipped with a chisel to ensure proper bond between grout and the foundation concrete and shall be thoroughly cleaned.

**D-31. Painting:-**

After all inspection and tests have been conducted to the satisfaction of the engineer-in-charge, the steel surface to be painted or otherwise treated, shall be dried and thoroughly cleaned as per IS : 1477 part - 1. All steel work shall be given one protective coat of red oxide except where encased in concrete. The metal protection of approved shed and of ICI or British Paints or Jenson Nicholson or Shalimar paints shall be used for the work. The instructions of the manufacturers shall be followed in applying the paint.

**PRICE BID**

The price bid shall be as per the following format and the bidders are requested to fill the rates and send as mentioned in the NIT on Bid Submission.

<b>Item No.</b>	<b>Item Descriptions</b>	<b>Unit</b>	<b>Qty</b>	<b>Rate (Rs.)</b>	<b>Amount (Rs.)</b>
1	<p>Providing, fabricating and fixing Automatic sliding Gate of 7.00 Mtrx 1.80 Mtr of 2 leaf sliding on either sides fabricated with Rectangular Tubular Sections of 100x50x4mm as the outer frame and 50x50x3mm as the internal sections for distributions. The inner side shall have 2mm perforated MS sheet welded onto the outer frame. The Total length of the gate will be 14.00 Mtr. The Sliding gate should have following technical specifications,</p> <p>a. Capacity of the motor shall be sufficient for the movement of gates as per the above design, which is also to be verified before installation by the consultant. It should be wether proof and the elctrical fittings/fixtures shall be of IP-55 and suitable for S-3 duty conditions. The motor should have proper enclosure of GI sheet or equivalent and to be wether resistant.</p> <p>b. It should have locking arrangement along with both sides aldrops.</p> <p>c. The operation should be Remote and Manual in case of powe failure.</p> <p>d. Magnetic limit switch to be provided.</p> <p>e. The speed of the gate shall be 0.20 M/sec.</p> <p>f. The bottom rails are to be provided which will be fixed in concrete and should not be settled under movement of vehicles.</p> <p>g. Rate should be along with AMC for 1 year after the defect liablity period.</p> <p>h. Should have the following features such as Flashing Light, Remote Tranmitter, Key Selector, Photocells, Safety Edges.</p> <p>The rate should be along with one coat of primer and two coats of epoxy paint as per the approved colour.</p>	No.	1		-
2	<p>Same as above but without any Automation and sliding, the gate will be a swing type with a dimension of 1.5</p>	No.	1		-

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	Mtr x 1.80m Height.				
3	Providing and fixing RCC precast slab of 1000X900X50mm Thick in M 20 Grade of Concrete as per the instruction of Engineer-in-charge, including making platform, moulds, reinforcing the same with 8 mm torsteel at 150 c/c, casting, finishing, shifting, erection, alignment and pointing the joints with 1:3 in cm mortar with line and levels including curing etc complete with lifting arrangement.	No.	150		-
4	Providing and fixing RCC precast slab of 1000X(1500 to 2000)X50mm Thick in M 20 Grade of Concrete as per the instruction of Engineer-in-charge, including making platform, moulds, reinforcing the same with 8 mm torsteel at 150 c/c, casting, finishing, shifting, erection, alignment and pointing the joints with 1:3 in cm mortar with line and levels including curing etc complete with lifting arrangement.	No.	100		-
5	Providing and laying average 70mm thick PCC 1:2:4 by using graded stone aggregate 20mm nominal size for plinth protection over a consolidated soling bed including finishing the top surface with neat cement finish and making provisions for 12mm wide grooves at every 2.00 mtr interval along the length and at wall junctions and filling the joints with sand etc., complete as directed. Gentle Slope is required to be maintained away from the wall. The rate shall be inclusive of any shuttering required to be provided for making proper line and levels. Soling etc, as per the drawing shall be paid separately in the respective item of soling.	Rmt	142		-
6	Supplying, fabricating and placing in position TMT reinforcement bars Fe-500 of approved make conforming to IS - 1786 for RCC Structures/items as per design including transporting steel to the work site, handling wastage, decoiling, cutting, bending, fabricating to required shape, placing in position and binding with 18 gauge GI wires, welding if necessary by using approved welding rods etc., for all levels and structures complete. The quoted rate shall be inclusive of the cost of binding wire and the same will not be measured and paid separately. (Rolling margins and wastage shall not be paid). Measurement shall be made on the length basis and converted into weight by using standard co-efficient mentioned in the Technical Specifications.	MT	2		-

7	Providing and laying in Position Reinforced Cement Concrete machine batched, machine mixed and machine vibrated Design Mix cement concrete of below specified grade for structural elements. The rate shall also included the cost of admixtures required to be added to accelerate or retard the setting of concrete and improve workability without imparing strength and durability with necessary curing etc., complete as directed and working at all levels and heights. Minimum quantity of cement shall be as per IS 456-2000 latest revision. The Design Mix is to be approved by the contractor before using the same. Honey comb, if any, shall be rectified only with polymer concrete or epoxy mortar with quartz sand as suggested by Engineer-in-charge without any additional cost.				
7.1	M-25 Grade of concrete for foundations, including rafts, footings, Foundation Beams, Bases of Columns etc. The rate should be inclusive of shuttering materials as per the instructions of the site incharge.	CUM	30		-
8	Providing, fabricating, fixing and placing structural steel works for Insert Plates and placing in position. Insert Plates shall be made from MS Plates of requisite thickness and mild stone rods as per the design and drawing. Fabrication to be done as per I.S Codes of latest revision. Insert Plates are to be painted with one coat of primer of Zinc Phosphate and 2 Coats of Synthetic Enamel Paint of approved make and with approved colour.	MT	5		
9	Supply and fixing of trapezoidal profiled colour coated Aluminum / Zinc alloy steel for roofing and side sheeting with 0.5mm TCT (total coated thickness) of approved colour on the shed of LP Receiver Area	Sq. Mtr.	130		
	<b>Total</b>				-
	Add GST				
	Grand Total				