



**CIPET-Institute of Plastics Technology, Lucknow**  
(Department of Chemicals & Petrochemicals,  
Ministry of Chemicals & Fertilizers, Govt. of India)

**E-TENDER NO: CIPET/LUCK/E-TEN-12/DISMANTLING AND  
RE-CONSTRUCTION/2019-20 Dated- 03/09/2019**

**E-TENDER DOCUMENT**

**(To be used for Dismantling and Re-Construction on  
First Floor of Hostel Mess Building Tender by the eligible firms)**

**Dismantling and Re-Construction of Room on First Floor  
of Mess Building at CIPET-IPT, Lucknow Centre**

**B-27, Amausi Industrial Area, Lucknow-226008, (Uttar Pradesh)**

**CONSULTANTS**

**M/s CIVIL CONSULTANTS,**  
003, Gauri Apartment,  
57, Hilton Lane,  
Lucknow. (UP)  
Ph.2209859, 4230613  
Fax No.0522 -2209241  
e-mail:civilconsultants@yahoo.co.in

**EMPLOYER:-**

**CIPET-IPT Lucknow**  
B-27, Amausi Industrial Area,  
Lucknow – 226008 (U.P.)  
Ph. 7607194016 / 7607194024  
e-mail:cipetlko2@gmail.com,

## **INTRODUCTION**

Central Institute of Plastics Engineering and Technology (**CIPET**) is an autonomous Institute under the Department of Chemicals and Petrochemicals, **Ministry of Chemicals and Fertilizers, Government of India**. CIPET Head Quarters was established at Madras in 1968 with UNDP assistance. This is the only institute of its kind in India where all the facilities like design, tooling, processing and testing of Plastics are available under one roof. CIPET caters to the needs of plastic industries through manpower training, processing, design and CAD/CAM/CAE, testing, consultancy, advisory and developmental services.

To meet the growing needs of Plastics conversion industry, CIPET has established extension Centres in various States of the country. Each centre of CIPET has been equipped with state-of-the-art machinery in the area of mould/product design and development, CAD, Plastics processing and testing/quality control. Apart from developing training manpower and technical services for Plastics industries, each centre has been entrusted with a specific thrust area for development

**CIPET- INSTITUTE OF PLASTICS TECHNOLOGY**  
 (Department of Chemicals & Petrochemicals,  
 Ministry of Chemicals & Fertilizers, Govt. of India)  
 B-27, Amausi Industrial Area, Lucknow-226008 (U.P.)  
 Ph. No.: 7607194016 / 7607194024  
 Email: cipetlko2@gmail.com Website: www.cipet.gov.in

### **NOTICE INVITING E-TENDER**

**E-TENDER NO: CIPET/LUCK/E-TEN-12/DISMANTLING AND RE-CONSTRUCTION/2019-20 Dated- 03.09.2019**

CIPET-IPT Lucknow invites E-Tender in two Bid systems (Technical and Commercial) from Contractor for **Dismantling and Re-Construction of Room on First Floor of Mess Building at CIPET-IPT, Lucknow centre with an estimated cost of Rupees Forty-Three Lakh Only.**

S. No.	Tender No. & Date	Name of the Item/Work	Quantity (Approx.)	Estimated Cost (Approx.) Rs.	EMD Rs.	Completion Time	Tender Fees in Rs.	Last Date & Time of Bid Submission
1	CIPET/LUCK/E-TEN-09/DISMANTLING AND RE-CONSTRUCTION/ 2019-20  Dated- 08/07/2019	Dismantling and Re-Construction of Room on First Floor of Mess Building at CIPET-IPT Lucknow centre	As per Bill of Quantities	43.07 Lakhs	0.86 Lakhs	5 Months	2500.00	23/09/2019, 17.00 Hrs.

Interested and eligible bidders may view and download detailed tender documents from CIPET's E-Tender portal [www.tenderwizard.com/CIPET](http://www.tenderwizard.com/CIPET), [www.cipet.gov.in](http://www.cipet.gov.in) & [www.eprocure.gov.in](http://www.eprocure.gov.in) **All Bids must be submitted through the online portal [www.tenderwizard.com/CIPET](http://www.tenderwizard.com/CIPET).** However, Bidders are also requested to submit a hard copy of the online Technical Bid duly sealed and signed to the Principal Director and Head, CIPET, **25/09/2019 up to 14.00 Hrs.**

The Tender Fee and EMD will be accepted in the form of Demand Draft/Banker's Cheque drawn on any Indian Nationalized Bank favouring **"CIPET Lucknow"** payable at Lucknow and shall be submitted at CIPET-IPT, Lucknow as specified on or before **25/09/2019 up to 14.00 Hrs** in separate sealed cover failing which bids will be summarily rejected. However, a soft copy of the Tender Fee and EMD instruments shall also be uploaded along with the Technical Bid to be submitted online.

**Salient information about the E-Tender:**

1. **Mode of submission: ONLINE.** No offline Tenders will be accepted.
2. **Availability of Tender Documents:** All Bid formats (Technical & Financial) are available ONLINE at CIPET's E-Tender portal [www.tenderwizard.com/CIPET](http://www.tenderwizard.com/CIPET). The registered vendors can download the Bids from these websites. However; the NIT is also available on websites- [www.cipet.gov.in](http://www.cipet.gov.in) & [www.eprocure.gov.in](http://www.eprocure.gov.in)
3. **Who can participate for this E-Tender:** The registered vendors of CIPET through [www.tenderwizard.com/CIPET](http://www.tenderwizard.com/CIPET) can only participate in this tender process.

4. **How to register by a vendor:**

The prospective bidders have to register with CIPET through the E-tender portal of CIPET at [www.tenderwizard.com/CIPET](http://www.tenderwizard.com/CIPET) by Online Payment of **Rs. 1,500/- + Service Tax (As Applicable) to M/S. KEONICS LTD.** On completion of the registration process, the bidders will be provided user ID and password. After receipt of User ID & Password, Bidders can log on at our E-Tender portal for downloading & uploading tender documents.

Tender Documents Fees of **Rs. 2,500/-** is Payable to CIPET, Lucknow in the form of Demand Draft from any Nationalize Bank not drawn before the Date of Releasing of NIT.

Processing Fees is **Rs., 7,500/- (plus taxes) Payable Online separately to M/S. KEONICS LTD.**

5. **Is there any device requirement for participation in e-Tender:** Yes, Bidders should have a valid Class 3 Digital Signature Certificate (DSC) device for participating in e-Tender. For integrity of data and its authenticity/non-repudiation of electronic records and to be compliant with IT Act 2000, it is necessary for each user to have a Digital Certificate (DC), also referred to as Digital Signature Certificate (DSC) of Class-III issued by a Certifying Authority (CA) licensed by Controller of Certifying Authorities (CCA) [refer <http://www.cca.gov.in>].
6. Contact details for the e-Tender related issue:

**Name of the Service Provider: KEONICS**

Contact Person	Telephone/E-mail	Remarks
Local Representative of		For, Vendor registration/ DSC/any other issue regarding e-Tender Process, please contact <b>KEONIS</b> as the details given in the previous Columns.
<b>KEONICS (Lucknow)</b>	<b>1. Mobile: 07844932491</b>	
<b>1. Mr. Shashank Kumar</b>	<b>Email: <a href="mailto:twhelpdesk746@gmail.com">twhelpdesk746@gmail.com</a>,</b>	
<b>2. KEONICS's Helpdesk:</b>	<b>011-49424365</b>	

**CIPET/LUCK/E-TEN-12/DISMANTLING AND RE-CONSTRUCTION/2019-20**

7. Bidders are hereby advised that all the documents to be submitted online are kept scanned and converted to PDF/JPG format in a separate folder on their computers before starting online submission. The schedule of rate (Excel Format) may be downloaded and rates may be filled appropriately in this format only. This file may also be saved in a separate folder on your computer.
8. While uploading/submitting the documents, it should be ensured that the file name should be the name of the document itself.
9. All pages of Tender documents with Addenda/Corrigenda (if any) must be signed with proper official stamp and date by the Bidders / or authorized power of attorney holders at the lower right-hand corner.
10. Bidders are advised to **visit CIPET's E-Tender portal regularly for any Addenda/Corrigenda** (if any) with regard to the E-Tender for which no separate paper advertisement will not be published.
11. **Last date of online submission of Tender bid: 23 /09/2019 up to 17.00 Hrs**
12. **EMD and Tender Fee:** Earnest money deposit shall be **Rs. 86,000/- (Rs. Eighty Six Thousand)** through Demand Draft has drawn in any nationalized bank in favour of CIPET-IPT, Lucknow A/c/ No. 533901011013003|| (Union Bank of India) payable at Lucknow. ~~must~~ be in the approved mode and Duly Signed & Sealed in separate cover along with filled Technical Bid and with necessary enclosures shall be submitted in physical form (hard copy) in person/by speed post on or before **25.09.2019 up to 14.00 Hrs.** at CIPET-IPT, Lucknow. Non- receipt of which the Tenders are liable for rejection.
13. **Date & Time of Technical Bid Opening: 25/09/2019 at 15.00 Hrs.**
14. **Date & Time of Financial Bid Opening:** Technically qualified bidders will be intimated the date & time after technical bid evaluation through the e-Tender portal.
15. **Venue for Opening Bids:** CIPET –IPT Campus, B-27, Amausi Industrial Area, Lucknow-226008 (U.P)

**16. Eligibility Criteria:-**

- Experience of the Firm : **Minimum 05 Years as on 31 /07/2019.**
- Annual Average Turnover  
(2016-17, 2017-18 & 2018-19) : **Rs. 60 Lakh & above in last 03 financial year**
- Individual Work Order : Experience of executing and completed similar works for Construction of Corporate Offices/Institutions/ Central Autonomous Body Central Public Sector undertaking/others etc. with a single order valuing **Rs. 35.00 Lakhs** or two work order each valuing more **than Rs. 24.00 Lakhs** & above during the last 3 financial years (2016-17, 2017-18 & 2018-19). Please enclose a copy of Work Orders and completion certificate

17. Conditional tender is liable to be rejected.

**CIPET-IPT reserves the absolute right to accept/reject any or all offers at any stage without assigning any reason whatsoever.**

**Principal Director & Head  
CIPET-IPT,  
Lucknow**

**TERMS AND CONDITIONS / INSTRUCTIONS TO BIDDER**

1. The Tenderer is expected to examine all instructions, forms, terms and specifications in the Tender Documents. Failure to furnish all information required for the Tender Documents or submission of a Tender not substantially responsive to the Tender Documents in every respect will be at the Tenderer's risk and may result in rejection of the Tender.
2. The Purchaser shall not be liable for any expenses whatsoever incurred by the Tenderer in the preparation of the tender whether his tender is accepted or not even if the purchaser opts for the complete withdrawal of invitation of Tender.
3. Contractor shall be responsible for any manufacturing defect, quality of material etc. which may result in poor quality.
4. Documentary evidence (signed by authorized signatory) proving that bidder fulfills the criteria as stated in Pre-qualification criteria.
5. Upon online submission of Tender Bids within the date prescribed as 23.09.2019 at 17.00 pm, a hard copy of **"TECHNICAL BID"** so uploaded also to be submitted in separate cover to CIPET-IPT Lucknow address on or before **25/ 09//2019 up to 14.00 Hrs compulsory**
6. Any Tender received after the deadline for submission of Tenders prescribed by the Purchase will be rejected. The conditional tender will be summarily rejected without prejudice, so tenderers are advised to quote the price as per N.I.T. conditions only.
7. Tenders shall remain valid for 60 days after the date of Tender.
8. In case the firm does not complete the work within the said period, liquidated damages will be charged @0.50% per week and maximum of 5%. of the value of the tendered amount
9. The contractor shall employ labour in sufficient number to maintain the required rate or progress and of quality to ensure workmanship.
10. The contractor shall pay to labour employed by him wages not less than fair wages as defined in the contract labour (Regulation & Abolition) Act'1970 and Rules made thereunder.
11. The contractor shall comply with the provisions of the payment of wages Act, 1938, workmen's Compensation Act'1923, Industrial dispute Act'1947, Maternity Benefit Act 1961 and Mines Act'1952, E.P.F. & M.P. Act'1952 or any other law relating they're to and rules made there.
12. The contractor shall indemnify the CIPET-IPT, Lucknow against any payment to be made under and for the observance of the Contract Labour (Regulation & Abolition) Act'1970 and Rules made thereunder without prejudice to his right to claim indemnity from his sub-contractors.

## **CIPET/LUCK/E-TEN-12/DISMANTLING AND RE-CONSTRUCTION/2019-20**

13. The tenderer shall pay Earnest Money Deposit Rs. 86,000/- in the form of Demand Draft drawn in favour of "CIPET" payable at Lucknow on or before 25 /09/2019 up to 14.00 hrs. The tenders received without the EMD in the prescribed form shall be rejected. The Earnest money of the Unsuccessful tenderers will be refunded within 15 days time from the completion of the tender process and issue of the work order.

14. The Earnest money of the tenderer shall be forfeited by CIPET without prejudice to other rights or remedies:

a) If the tenderer withdraws his tender during the period of tender validity specified in the tender document.

b) If, after acceptance of his tender, the tenderer fails to take up the job.

c) If, the tenderer fails to sign the contract in accordance with the terms and conditions of the contract.

d) If, after acceptance of his tender, the tenderer fails to furnish the balance of Security Deposit.

e) If, after acceptance of his tender, the tenderer fails to commence the work within seven days after receipt of the work order to that effect.

15. TDS (Tax Deducted at Source) and WCT (Work contract Tax) will be deducted as per prevailing rules and regulations of the Government, if applicable.

16. In case, your offer is approved, you will be required to submit security **deposit amount of Rs. 86,000 in** the shape of Demand Draft in favour of **"CIPET" payable at Lucknow.**

17. The Tenderer shall complete the Tender Form and fill the appropriate Financial Bid Furnished in the Tender Documents.

18. The Bidder shall indicate on the Financial Bid attached to these documents, the unit prices and total Bid Prices of the goods, proposed to supply under the Contract.

19. Financial Bid should be Uploaded in the prescribed format (Excel Format) given under price schedule of the E-Tender Document.

20. The rate quoted by the tenderer should be firm and no escalation on any account whatsoever shall be paid for this work.

21. CIPET-IPT will notify the successful tenderer in writing by a registered letter /fax/e-mail to be confirmed that his tender has been accepted.

22. The Principal Director & Head, CIPET-IPT, Lucknow reserves the right to accept or reject any tender or all offers at any time prior to award of contract without assigning any reasons whatsoever and no correspondence shall be entertained in this regard.

23. In the case of a dispute or differences arising between the purchaser and Supplier relating to any matter arising out or connected with this agreement, such dispute or differences shall be referred within the Jurisdiction of Court at Lucknow (Uttar Pradesh).

24. The contractor shall indemnify the CIPET-IPT, Lucknow against all legal obligations arising out of injury or death of any person engaged by the contractor for completing the assigned work.



**TECHNICAL BID****E-TENDER No.: CIPET/LUCK/E-TEN-12/ DISMANTLING AND RE-CONSTRUCTION/  
2019-20 DATED- 03/09/2019****DESCRIPTION: Dismantling and Re-Construction of Room on First Floor of Mess Building  
at CIPET-IPT, Lucknow centre**

Sl. No.	PARTICULARS	REMARKS
1.	Name of the Firm	
2.	Complete Postal Address with pin code	
3.	Telephone No. with STD code	
4.	Fax with STD code	
5.	Name of the Contact person	
6.	Mobile No.	
7.	e.mail ID	
8.	PAN (Permanent Account Number)	
9.	Certificates of Registration for Sales Tax/VAT/TAN and GST  Sales/VAT/CST No. TAN No. GST No.	
	<b>Eligibility Criteria:</b>	
10.	Experience of Firm: Minimum 05 Years as on 31 /07/2019	
11.	Experience of executing similar works for Construction of Corporate Offices / Institutions / Central Autonomous Body / Central Public sector undertaking/ other etc. with a single order valuing Rs. 35.00 Lakhs or two work order each valuing more than Rs. 24.00 Lakhs & above during the last 3 financial years(2016-17, 2017-18 & 2018-19). Please enclose a copy of work orders and completion certificate.  1. Name of Work  2. Name of the Client  3. Year of Commencement  4. Year of Completion  5. Value of the Work	

**CIPET/LUCK/E-TEN-12/DISMANTLING AND RE-CONSTRUCTION/2019-20**

<b>12.</b>	The firm should have Average Annual Turnover <b>Rs. 60 Lakhs during the last Three financial each year (2016-17, 2017-18 &amp; 2018-19).</b> Enclose a copy of Balance sheet and Income Exp./Profit & Loss A/c.	
<b>13.</b>	Income Tax Return of Three Assessment Years <b>(2016-17, 2017-18 &amp; 2018-19).</b>	
<b>14.</b>	Demand Draft No. & Date for Tender Fees <b>of Rs. 2500/-</b>	
<b>15.</b>	Legal disputes with the clients, details if any (If Nil, give a certificate to the effect that no legal Case/dispute is pending in any court against Firm/ its Executives etc. with any party).	
<b>16.</b>	The validity of Offer ( In days) 60 days.	

**Date:**

**Seal & Sign. of bidder**

**CHECK LIST**

**TENDER No.: CIPET/LUCK/E-TEN-12/DISMANTLING AND RE-CONSTRUCTION /  
2019-20 Dated- 03/09/2019**

1. Have you deposited requisite Tender Fees & EMD?
2. Have you enclosed a valid Registration Certificate of Establishment of Firm?
3. Have you enclosed your PAN Certificate?
4. Have you enclosed the Income Tax Return Certificate for the last 3 years?
5. Have you enclosed Registration Certificate of VAT/TAN and GST?
6. Have you sealed & signed all the pages of Tender document?
7. Have you enclosed experience certificate/work orders copies?
8. Have you enclosed Annual Turnover Certificate?
9. Profile of the Firm including staff strength, T&P, List of Machineries etc.
10. Registration with Govt. / Non Govt. Organisation.

## **INSTRUCTIONS TO BIDDERS**

### **INTRODUCTION**

CIPET intends to Construct CIPET-ITP Campus at  
B-27, Amausi Industrial Area,  
Lucknow – 226008 (UP)  
Ph. 0522-2436227, 7607194014  
E-mail: cipetlko2@gmail.com

The bidder shall bear all costs associated with the preparation and submission of the bid, and OWNER (CIPET-IPT) will, in no case, be responsible or liable for these costs, regardless of the conduct or outcome of the bidding process.

### **ARTICLE –1:**

The offer must be submitted online by the prospective bidders in two parts namely (i) **Technical Bid**, (ii). **Commercial Bid**. After completing the online submission of bids on the websites [www.tenderwizard.com/CIPET](http://www.tenderwizard.com/CIPET), the Bidders are also requested to submit a hard copy of the online submitted Technical Bid only, duly sealed and signed, to the Principal Director and Head, CIPET-IPT, LUCKNOW by **25/09/2019 up to 14:00 Hrs.** Time allowed for completion of the work is **5 months from the date of allotment of work.**

### **ARTICLE –2:BIDDER QUALIFICATION CRITERIA (BQC)**

21 The tendering firm should have successfully completed similar nature of works for construction of corporate offices/institutions/central autonomous body/central public sector undertaking /others etc. with a single order valuing **Rs. 35.00 Lakh** or two work orders each valuing more than **Rs. 24.00 Lakh** and above during the last 3 financial each year (2016-17,2017-18 and 2018-19) Please enclose copy of work orders.

22 The Annual turnover of the tendering firm should be **minimum 60 Lakh** during the last three financial years.

23 Conditional tender is liable to be rejected.

### **ARTICLE – 3: DOCUMENTS COMPRISING THE TECHNICAL BID**

The bid should be prepared by the bidder in English language only and shall comprise the following:

31 **EMD of Rs. 86,000.00 either by D.D. or through Nationalized Bank's Guarantee issued in favour of CIPET, Lucknow.**

32 **Certificates of having Completed similar nature of work of value not less than 35 Lakh as single order during the last three years.**

33 Balance Sheet of the firm for last three financial years.

- 34 Profile of the Firm including staff strength, T&P, List of Machineries etc.
- 35 Registration with Govt. / Non Govt. Organization.

#### **ARTICLE – 4: COMMERCIAL BID**

4.1 The bidder shall indicate on the appropriate price schedule attached to these documents Complete Prices of the goods offered to be supplied under the contract.

4.1.1 Price shall be quoted on Item rate basis, in the prescribed Schedule of rate by bidder and in strict compliance to the format of the Schedule of rate for each item of scope of supply in the following manner.

Ex-works price including packing & forwarding, taxes & duties.

4.1.2 Further, compliance of necessary statutory stipulations including obtaining requisite license and liasoning with statutory authorities for completing all formalities in this regard shall be solely the bidder's responsibility. Owner shall not be responsible for any non-compliance and or lack of information on the part of individual bidder in this respect.

#### **4.2 Fixed Price**

4.2.1 Price quoted by the bidder shall remain fixed during the bidder's performance of the contract and for repeat order purpose and not subject to variation on any account.

4.2.2 Prices shall be written in both words and figures. In the event of difference, the price in words shall be valid and binding. Unit prices shall be considered correct in the event of any discrepancy with regard to total price.

#### **ARTICLE – 5: PERIOD OF VALIDITY OF BIDS**

5.1. Bids shall be kept valid for **60 days** from the final bid due date. A bid valid for a shorter period may be rejected by the OWNER as non-responsive.

5.2. In exceptional circumstances, the OWNER may solicit the bidder's consent for an extension of the period of validity. The request and the responses thereto shall be made in writing or by cable or Telex/Fax. A bidder granting the request will not be required, nor permitted to modify substance of his bid or change the price.

#### **ARTICLE – 6: SEALING AND MARKING OF BIDS**

6.1 After completing the online submission of bids on the websites [www.tenderwizard.com/CIPET](http://www.tenderwizard.com/CIPET), the Bidders are also requested to submit a hard copy of the online submitted Technical Bid only, duly sealed and signed, to the Principal Director and Head, CIPET-IPT, LUCKNOW **by 25 /09/2019 up to 14:00 Hrs.**

The envelope, bearing the Tender No. and the words –QUOTATION, DO NOT OPEN shall be addressed to the EMPLOYER at the following address:

**CIPET-IPT**

B-27, Amausi Industrial Area,  
Lucknow – 226008 (UP)  
Ph. 0522-2436227, 7607194014  
E-mail: [cipetlko2@gmail.com](mailto:cipetlko2@gmail.com)

**ARTICLE – 7: PROFORMA OF AGREED TERMS & CONDITIONS TO BE FILLED DULY SIGNED AND SUBMITTED ALONGWITH THE PRICED BID.**

**ARTICLE – 8: PRELIMINARY EXAMINATION OF BIDS**

8.1 Technical bids, including commercial conditions and variations thereof, if any, shall be scrutinized by OWNER.

8.2 Clarification of bids: After opening of the bids, to assist in the examination, evaluation and comparison of bids, the OWNER may, at its discretion, ask the bidder for a clarification of its bid. The request for such clarification and the response shall be in writing. Change in price or substance of bids shall not be sought, offered or permitted during such written clarification of the bid.

**ARTICLE - 9: OPENING OF PRICE BIDS**

The price bids of the substantially who have been technically qualified will be opened. The price bids of those bidders determined to be not substantially responsive will be rejected.

**ARTICLE – 10: EVALUATION AND COMPARISON OF BIDS**

10.1 The OWNER will evaluate and compare the bids

10.2 Arithmetical errors will be rectified on the following basis :-

If there is a discrepancy between the unit price **and total price, that is obtained by multiplying the unit price and quantity, the unit price shall prevail and the total price will be corrected.** If there is a discrepancy between the total amount and the sum of total prices, the sum of the total prices shall prevail and the total bid amount will be corrected.

10.3 OWNER's evaluation and comparison of prices shall take following in account.

The evaluated price of bidders shall include the following:-

- i).Ex-works price including packing & forwarding
- ii).Excise duty on the finished goods.
- iii).Sales tax on finished goods.

- iv).Commercial Loading if any.
- v).Technical loading, if any.
- vi).Freight and insurance Charges upto site including transit insurance

10.4 Evaluated price of all the bidders, at 10.3 above, shall be compared together to arrive at the lowest bid.

Out of the above comparison the lowest bidder shall be considered for award

#### **ARTICLE – 11: REJECTION CRITERIA**

Owner requests Bidders to accept all terms & conditions stipulated in this document without taking any deviation for speedy decision. Bidders are requested to note that taking deviation or suggesting modifications to the terms & conditions contained in the bid document may result in bids be considered non-responsive, and the bid is liable for rejections.

#### **ARTICLE - 12: SIGNING OF CONTRACT**

Successful Bidder will be required to sign the Contract Agreement Form within a period of 15 days of receipt of Letter of Intent / Notification of award.

#### **ARTICLE - 13: OTHER DETAILS**

- a) Bid documents are non-transferable
- b) CIPET reserves the right to accept any bid and to reject any or all bids without assigning any reason at any time or any stage. CIPET decision is final in all respects.
- c) CIPET shall not be responsible for any delay, loss or non-receipt of Bid. Telex/Fax/Telegraphic offers shall not be accepted.

#### **ARTICLE - 14: SITE ADDRESS**

##### **CIPET- INSTITUTE OF PLASTICS TECHNOLOGY**

B-27, Amausi Industrial Area,  
Lucknow – 226008 (UP)  
Ph. 0522-2436227, 7607194014  
E-mail: [cipetlko2@gmail.com](mailto:cipetlko2@gmail.com)

**BID FORM**

To:

**CIPET-CENTRAL INSTITUTE OF PLASTICS TECHNOLOGY**

B-27, Amausi Industrial Area,  
Lucknow – 226008 (UP)  
Ph.: 0522-2436227, 7607194014  
E-mail: cipetlko2@gmail.com

Dear Sir,

Having examined the Conditions of Contract and Specifications. We, the undersigned, offer to do the said work in conformity with the said Drawings, Conditions of Contract and specifications for the same .

We undertake, if our bid is accepted, to complete entire work as specified in the Contract within **5 Months** calculated from the date of Letter of Intent.

We agree to abide by this bid for a period of **sixty days** from the date fixed for bid opening under Instructions to Bidders and it shall remain binding upon us and may be accepted at any time before the expiration of that period.

Until a formal contract is prepared and executed, this bid, together with your written acceptance thereof in your notification of award, shall constitute a binding Contract between us.

We understand that you are not bound to accept the lowest or any bid, you may receive.

**Date :**

**Place :**

**Contractor**

**Signature with Seal**



**Agreed upon Terms & Conditions**

Bidder M/s.....

Offer Ref. No.....

This Questionnaire duly filled in should be submitted along with Bid. Confirmation given hereunder to various Terms & Conditions should not be repeated elsewhere in the Bid.

ALL THE COMMERCIAL TERMS & CONDITIONS SHOULD BE INDICATED IN THIS FORMAT ONLY. IF REQUIRED DETAILS INCLUDING DEVIATION TO TCC, IF ANY, SHOULD BE INDICATED AS AN ANNEXURE TO THIS FORMAT.

Sl. No.	Description	Bidder's Confirmation
1	Ensure and confirm that unit prices quoted in 'Schedule of Rates' are basis of provision of bid document for the tendered scope of works.	
2	Confirm that the offer shall remain valid for acceptance for <b>60 days</b> from Final Bid Due date as per provisions of the Bid Document.	
3	Confirm acceptance of Completion Schedule as per requirement specified in Bid Document to be reckoned from date of issue of Fax of Intent (FOI)/LOA/WO, whichever is issued first.	
4	Indicate present rate of Service Tax, if applicable & payable extra, on the quoted works & services.	
5	Confirm acceptance of Price Reduction Schedule (PRS) for delay in completion/delivery beyond contractually agreed completion schedule as specified in the Bid Document.	
6	Confirm that in case of delay in completion beyond Contractual completion Date, the invoice shall be submitted for the amount duly reduced to the extent of PRS as per provisions of bidding document.	
7	Confirm in case of delay in completion beyond Contractual completion schedule any new or additional taxes and duties imposed, after contractual completion schedule shall be to bidder's account	
8	Quoted price will remain firm and fixed till complete execution of the order k Order (LOA/WO) shall be placed within r validity, as Notification of Award of Contract	
9	Confirm acceptance to provisions of DEFECT LIABILITY PERIOD (DLP) as per provisions of Bid Document.	
10	Confirm acceptance in to of the Terms & Conditions contained in :	

**CIPET/LUCK/E-TEN-12 DISMANTLING AND RE-CONSTRUCTION/2019-20**

	i) Instruction to Bidders (ITB) ii) Terms & Condition of Contract (TCC) iii) All other commercial documents/attachments of Tender Documents. b) In case of reservations, confirm that clause wise comments deviations sought have been specified as annexure to this format. c) All the terms & conditions have been indicated in this format (including annexure, if any) and have not been repeated in the bid elsewhere. It is noted that terms & conditions indicated elsewhere including any printed Terms & Conditions, shall not be considered by CIPET.	
11	Confirm unconditional acceptance to provisions of Force Majeure & Resolution of Dispute / Arbitration Clauses of Bid Document	
12	Please furnish details of EMD, as per provisions of Bid Document: EMD(DD/BC) No., amount & Date	
13	Indicate Name & Contact Telephone / Fax No. of Person(s) to whom queries, if any, are to be addressed against your bid	
14	CIPET reserves the right to make any changes in the terms & conditions of the Bid Document and to reject any or all bids including those received late or incomplete at their sole discretion at any stage  Or time. CIPET decision is final in all respects.	
15	Furnish your SERVICE TAX Registration No.	
16	Bidder confirms that he will bear all income tax liability both for corporate & personal tax against the contract, if awarded.	
17	Bidder confirms that they have understood the magnitude of scope of works as specified in the bidding document & its attachment clearly and have assessed the site conditions in totality, before submission of quote against the said RFQ/Bid Document.	

BIDDER CONFIRMS THAT IN CASE OF CONFLICTING VERSION OF VARIOUS TERMS & CONDITIONS AT DIFFERENT PLACES THE CONFIRMATION FURNISHED AS ABOVE SHALL BE CONSIDERED OVERRIDING AND FINAL AND ANY OTHER DEVIATION INDICATED ELSEWHERE SHALL BE TREATED AS REDUNDANT.

Signature \_\_\_\_\_

Name & Designation \_\_\_\_\_

Tel. No. \_\_\_\_\_

Fax No. \_\_\_\_\_

E-mail ID \_\_\_\_\_

Office Stamp \_\_\_\_\_

**Proforma of Letter of Authority for Negotiations and  
Signing the Agreement**

No. Date:

**M/S CIPET- Institute of Plastics Technology**  
B-27, Amausi Industrial Area,  
Lucknow – 226008 (UP)  
Ph.: 0522-2436227, 7607194014  
E-mail: cipetlko2@gmail.com

Sub: .....

Dear Sirs,

We.....do hereby confirm that Mr./ Ms.  
(**name and address**).....  
is/are authorized to represent us for negotiations and to conclude the Agreement on our behalf with you  
against your above cited tender for.....

We confirm that we shall be bound by all and whatsoever our representatives shall commit.

Yours faithfully

Signature

Name and Designation

for & on behalf of BIDDER

---

**Note:** This letter of Authority should be on the letterhead of the Bidders and should be signed by a person competent and having the power of attorney ( **power of attorney shall be annexed**) to bind the bidder.

**Deviation Form**

To,

**M/S CIPET- Institute of Plastics Technology**

B-27, Amausi Industrial Area,

Lucknow – 226008 (UP)

Ph.0522- 2437646, 7607194014

E-Mail: cipetlko2@gmail.com

**Name of Bidder :-**

**Notes :**

1. BIDDER may give here a consolidated list of deviations/ clarifications/ comments for all sections of the Bid documents which for an appropriate offer are considered unavoidable by him.
2. Deviations/ clarifications mentioned elsewhere in the offer shall not be binding on the CIPET and any such deviations if indicated elsewhere other than this form will render the offer non-responsive and shall liable to be rejected.
3. BIDDER shall state the reason for the deviations in the Remark column
4. Only the deviations listed herein, in conjunction with the original tender, shall constitute the contract document for the award of the job to the BIDDER

Sec No. Cls. No./Requirements as per tender by Bidder 2.3.4. Deviation Clarification by the Bidder    Remark    Page No.

---

The Bidder confirms that all clauses of the Bidding document as are not listed above are fully complied by the BIDDER.

**(Signature of Bidder)**

**E-TENDER NO: CIPET/LUCK/E-TEN-12/DISMANTLING AND  
RE-CONSTRUCTION /2019-20 Dated-03/09/2019**

**TENDER FOR CONSTRUCTIONS OF DISMANTLING AND RE-  
CONSTRUCTION OF ROOM ON FIRST FLOOR OF MESS BUILDING,  
CIPET-IPT CAMPUS AT B-27, AMAUSI INDUSTRIAL AREA,  
LUCKNOW.**

**VOLUME I OF V**

**TERMS & CONDITIONS OF CONTRACT**

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## **TERMS & CONDITIONS OF CONTRACT**

### **SECTION- I DEFINITIONS**

#### **1 Definition of Terms:**

- 1.1 In this CONTRACT (as here-in-after defined) the following words and expressions shall have the meanings hereby assigned to them except where the context otherwise required.
- 1.1.1 The EMPLOYER or OWNER means CIPET- Institute of Plastics Technology, (Ministry of Chemicals & Fertilizers, Govt. Of India) having its Corporate office at Guindy, Chennai.
- 1.1.2 The "CONTRACTOR" means the person or the persons, firm or Company or corporation whose tender has been accepted by the EMPLOYER and includes the CONTRACTOR's legal representatives his successors and permitted assigns.
- 1.1.3 The -PROJECT-IN-CHARGE" shall mean the person designated from time to time by the CIPET-IPT and shall include those who are expressly authorized by him to act for and on his behalf for operation of this CONTRACT.
- 1.1.4 The "WORK" shall mean and include all items and things to be supplied/ done and services and activities to be performed by the CONTRACTOR in pursuant to and in accordance with CONTRACT or part thereof as the case may be and shall include all extra, additional, altered or substituted works as required for purpose of the CONTRACT.
- 1.1.5 The "PERMANENT WORK" means and includes works which will be incorporated in and form a part of the work to be handed over to the EMPLOYER by the CONTRACTOR on completion of the CONTRACT.
- 1.1.6 "CONTRACT DOCUMENTS" means collectively the Tender Documents, Designs, Drawings Specification, Schedule of Quantities and Rates, Letter of Acceptance and agreed variations if any, and such other documents constituting the tender and acceptance thereof.
- 1.1.7 Architect/Consultant mean, **Civil Consultants**, who are the consulting architect to the Employer for this project and having registered office at 003, Gauri Apartment, 57-Hilton Lane, Meerabai Marg, Lucknow, Uttar Pradesh.
- 1.1.8 The "SUB-CONTRACTOR" means any person or firm or Company (other than the CONTRACTOR) to whom any part of the work has been entrusted by the CONTRACTOR, with the written consent of the Employer & Architect.
- 1.1.9 The "CONTRACT" shall mean the Agreement between the EMPLOYER and the CONTRACTOR for the execution of the works including therein all contract documents.
- 1.1.10 The "SPECIFICATION" shall mean all directions the various technical specifications, provisions attached and referred to the Tender Documents which pertain to the method and manner of performing the work or works to the quantities and qualities of the work or works and the materials to be furnished under the CONTRACT for the work or works.
- 1.1.11 **The "DRAWINGS" shall include plans and tracings or prints or sketches thereof with any modifications approved in writing by PROJECT - IN-CHARGE and such other drawing as may, from time to time, be furnished or approved in writing by the PROJECT -IN- CHARGE.**
- 1.1.12 The "TENDER" means the proposal along with supporting documents submitted by the CONTRACTOR for consideration by the EMPLOYER.

## **CIPET/LUCK/E-TEN-12 DISMANTLING AND RE-CONSTRUCTION/2019-20**

- 1.1.13 The "COMPLETION CERTIFICATE" shall mean the certificate to be issued by the PROJECT -IN-CHARGE when the works have been completed entirely in accordance with CONTRACT DOCUMENT to his satisfaction.
- 1.1.14 The "FINAL CERTIFICATE" in relation to a work means the certificate regarding the satisfactory compliance of various provision of the CONTRACT by the CONTRACTOR issued by the PROJECT -IN-CHARGE/EMPLOYER after the period of liability is over.
- 1.1.15-DEFECT LIABILITY PERIOD| in relation to a work means the specified period from the date of COMPLETION CERTIFICATE upto the date of issue of FINAL CERTIFICATE during which the CONTRACTOR stands responsible for rectifying all defects that may appear in the works executed by the CONTRACTOR in pursuance of the CONTRACT and includes warranties against Manufacturing/Fabrication/ Erection/Construction defects covering all materials plants, equipment, components, and the like supplied by the CONTRACTOR, works executed against workmanship defects.
- 1.1.16 "TEMPORARY WORKS" shall mean all temporary works of every kind required in or about the execution, completion or maintenance of works.
- 1.1.17 "PLANS" shall mean all maps, sketches and layouts as are incorporated in the CONTRACT in order to define broadly the scope and specifications of the work or works, and all reproductions thereof.
- 1.1.18 "SITE" shall mean the lands and other places on, under, in or through which the permanent works are to be carried out and any other lands or places provided by the EMPLOYER for the purpose of the CONTRACT.
- 1.1.19 "APPROVED" shall mean approved in writing including subsequent written confirmation of previous verbal approval and "APPROVAL" means approval in writing including as aforesaid.
- 1.1.20 "METRIC SYSTEM" - All technical documents regarding the construction of works are given in the metric system and all work in the project should be carried out according to the metric system. All documents concerning the work shall also be maintained in the metric system.



**SECTION-II GENERAL INFORMATION**

**2 General Information**

**2.1 Location of Site:** The proposed location of Project site is

CIPET-IPT, B-27, Amausi Industrial Area,  
Lucknow – 226008 (UP)  
Ph.: 0522-2436227, 7607194014  
e-mail: [cipetlko2@gmail.com](mailto:cipetlko2@gmail.com)

**2.2 Site Inspection:** The Tenderer is encouraged to visit & examine the site of works and its surroundings and obtain all information that may be necessary to prepare the tender and entering into a contract for construction of the works. No claim / extension of time whatsoever be entertained on account of prevailing site conditions. The cost of visiting the site shall be at the tenderers own expense.

**2.3 Scope of Work:** Scope of work of **Dismantling and Re-Construction of Room on First Floor of Mess Building, Lucknow Building including** all Civil and Electrical as per Site Conditions and requirements of related works complete in all respects as per the Owner/Architects satisfactions.

**The CONTRACTOR shall provide all necessary materials, equipment, labour etc. for the execution and maintenance of the WORK till completion unless otherwise mentioned in the Tender Document.**

**2.4 Water Supply:** Contractor shall make their own arrangements for water supply required for the work including that required by sub-contractors & labourers . Water must be clean, fresh and free from earth, vegetable or organic matter, acid or alkaline substance in solution or suspension. All pumping installations, pipe net work and distribution & storage system will have to be carried out by the Contractor at his own risk and cost.

Contractors will be allowed to use water from existing four numbers of wells available at site, but no guarantee is given that the quantity available should be sufficient. Also there is item of Borewell/s to be executed in the SOR, which can be executed before start of the WORK by the contractor and water can be used for construction purpose. **If found fit for construction purpose duly tested in the recognized testing Lab.**

**However, the Employer does not guarantee the supply of water and this does not relieve the Contractor of his responsibility in making his own arrangement and for the timely completion of the various works as stipulated.**

**2.5 Power Supply:**

- 2.5.1** The Contractor shall arrange with the concerned Electricity Supply Authorities for a temporary meter and supply to the site and shall provide all temporary wiring, power and lighting points for the whole of the works and clear away when no longer required. He shall pay all charges for the same and for electricity consumed, including that consumed by Subcontractors.
- 2.5.2** CONTRACTOR shall also make arrangements for DG set so that the work is not hampered in case of power shortage/failure.
- 2.5.3** No claim for compensation due to any failure or short supply of electricity shall be admissible.

**2.6 Land for Contractor's Field Office, Godown and Workshop:**

The EMPLOYER shall at his own discretion and convenience and for the duration of the execution of the work make available near the site, land for construction of Contractor's Temporary Field Office, godowns workshops and assembly yard required for the execution of the CONTRACT. The CONTRACTOR shall at his own cost construct all these temporary buildings and provide suitable water supply and sanitary arrangement and get the same approved by the PROJECT -IN-CHARGE.

On completion of the works undertaken by the CONTRACTOR, he shall remove all temporary works erected by him and have the SITE cleaned as directed by PROJECT-IN-CHARGE. If the CONTRACTOR fails to comply with these requirements, the EMPLOYER may at the expenses of the CONTRACTOR remove such surplus, and rubbish materials and dispose off the same as he deems fit and get the site cleared as aforesaid; and CONTRACTOR shall forthwith pay the amount of all expenses so incurred and shall have no claim in respect of any such surplus materials disposed off as aforesaid. But the EMPLOYER reserves the right to ask the CONTRACTOR any time during the pendency of the CONTRACT to vacate the land by giving 7 days notice on security reasons or on national interest or otherwise. Rent may be charged for the land so occupied from contractor by the Employer.

The CONTRACTOR shall put up temporary structures as required by them for their office, fabrication shop and construction stores only in the area allocated to them on the project site by the EMPLOYER or his authorised representative. No tea stalls/canteens should be put up or allowed to be put up by any CONTRACTOR in the allotted land or complex area without written permission of the EMPLOYER.

No unauthorised buildings, constructions or structures should be put up by the CONTRACTOR anywhere on the project site.

For uninterrupted fabrication work, the CONTRACTOR shall put up temporary covered structures at his cost within Area in the location allocated to them in the project site by the EMPLOYER or his authorised representative.

No person except for authorised watchman shall be allowed to stay in the plant area/ CONTRACTOR's area after completion of the day's job without prior written permission from PROJECT-IN-CHARGE.

2.7 **Land for Residential Accommodation**:- No Land shall be made available for residential accommodation for staff and labour of CONTRACTOR.

### **SECTION-III GENERAL INSTRUCTIONS TO TENDERERS**

#### **3 Submission of Tender:**

- 3.1 TENDER must be submitted without making any additions, alterations, and as per details given in other clauses hereunder. The rate shall be filled only in the schedule given in this Tender Document.
- 3.2 Covering letter alongwith its enclosures accompanying the Tender Document and all further correspondence shall be submitted in duplicate.
- 3.3 The tenderers are strictly advised to adhere to the terms and conditions stipulated in the tender document.

#### **4 Documents:**

4.1 General: The tenders shall accompany the following:

- i). The duly signed & filled in original tender document.
- ii) Earnest money in the manner specified in Clause 6 hereof.
- iii) Power of Attorney or a true copy thereof duly attested by a Gazetted Officer in case an authorized representative has signed the tender.
- iv) Information regarding tenderers in the proforma enclosed.
- v) Organization chart giving details of field management at site, the tenderer proposes to have for this job.
  
- vi) Details of construction plant and equipments available with the tenderer for using in this work.
- vii) Details of present commitment as per proforma enclosed to tender.
- viii) Data required regarding SUB-CONTRACTOR(s)/ Supplier/ Manufacturers and other technical informations the tenderer wish to furnish.

4.2 **All pages are to be Initialed:** All the tender pages shall invariably be signed with date by the tenderer / or by a person holding power of attorney authorising him to sign on behalf of the tenderer at the lower right hand corner.

4.3 **Rates to be in Figures and Words:**

The tenderer shall quote all the rates and amounts in figures and words in English . In case of any discrepancies are found between the RATES in FIGURES and WORDS or the AMOUNT quoted in the tender, the following procedure shall be followed:

- a) When there is difference between the rates in figures and words, the rate which corresponds to the amount worked out by the tenderer shall be taken as correct.
- b) When the rate quoted by the tenderer in figures and words tally but the amount is incorrect the item rate quoted by the tenderer shall be taken as correct.

c) When it is not possible to ascertain the correct rate by either of the above methods, the rate quoted in words shall be taken as correct.

4.4 Corrections and Erasures: All correction(s) and alteration(s) in the entries of tender paper shall be signed in full by the TENDERER with date. No erasure or over writing is permissible.

#### **4.5 Signature of Tenderer:**

The TENDERER shall contain the name, residence and place of business of person or persons making the tender and shall be signed by the TENDERER with his usual signature. Partnership firms shall furnish the full names of all partners in the tender. It should be signed in the partnership's name by all the partners or by duly authorised representatives followed by the name and designation of the person signing. Tender by a corporation shall be signed by an authorised representative, and a Power of Attorney in that behalf shall accompany the tender. A copy of the constitution of the firm with names of all partners shall be furnished.

#### **5 Transfer of Tender Documents:**

Transfer of Tender Documents purchased by one intending tenderer to another is not permissible.

#### **6. Earnest Money Deposit:**

6.1 The tenderer shall furnish, as part of his tender, an interest free earnest money deposit by way of demand draft / Banker's Cheque in favour of „**CIPET-Lucknow**“ alongwith tender document. The tenders not accompanying the earnest money deposit shall summarily be rejected.

6.2 The earnest money deposit of unsuccessful tenderers will be returned within 30 days of the end of the tender validity period specified in Sub-Clause 7.1.

6.3 The earnest money deposit of the successful tenderer shall be adjusted against security deposit/performance security to be deducted from RA bills.

6.4 The earnest money deposit may be forfeited:-

- a) If the tenderer withdraws the tender after tender opening during the period of tender validity; or
- b) In the case of a successful tenderer, if the tenderer fails to sign the agreement within 15 days of the receipt by him of the Notification of Acceptance of Tender.

#### **7 Tender Validity:**

7.1 Tenders shall remain valid for a period not less than „ **sixty days** “ from the date of opening of the tender.

7.2 The tenderers shall not be entitled during the said period of five months', without the consent in writing of the EMPLOYER, to revoke or cancel his tender or to vary the tender given or any term thereof. In case of tenderer revoking or canceling his tender or varying any term in regard thereof without the consent of EMPLOYER in writing, the EMPLOYER shall forfeit Earnest Money deposited by him alongwith tender.

7.3 In exceptional circumstances, prior to expiry of the original time limit, the EMPLOYER may request that the tenderers may extend the period of validity for a specified additional period. The request and the tenderers responses shall be made in writing or by cable. A tenderer may refuse the request without forfeiting his earnest money deposit. A tenderer agreeing to the request will not be required or permitted to modify his tender.

## **8 Addenda/Corrigenda**

8.1 Addenda/ Corrigenda if any to the Tender Documents will be issued in duplicate prior to the date of opening of the tenders.

8.2 Tenderer will retain his copy of each Addendum/Corrigendum and attach original copy duly signed along with his offer. All Addenda/Corrigenda issued shall become part of Tender Documents.

## **9 Right of Employer to Accept or Reject Tender:**

**9.1 The employer reserves the right to accept or reject any tender, and to cancel the tender process and reject all tenders, at any time prior to the award of contract, without thereby incurring any liability to the affected tenderer or tenderers or any obligations to inform the affected tenderer or tenderers of the grounds for the employer's action.**

## **10 Time Schedule**

10.1 Time is the essence of the contract and the WORK shall be executed strictly as per the TIME SCHEDULE specified in TENDER/CONTRACT Document. The time shall be reckoned from the date of award of contract and it includes the time required for mobilisation as well as testing, rectifications if any, retesting and completion in all respects to the entire satisfaction of the PROJECT -IN-CHARGE

10.2 A joint programme of execution of the WORK will be prepared by the PROJECT -IN-CHARGE and CONTRACTOR based on priority requirement of this project. This programme will take into account the time of completion mentioned in 10.1 above and the time allowed for the priority works by the PROJECT-IN-CHARGE.

10.3 Monthly/Weekly construction programme will; be drawn up by the PROJECT -IN-CHARGE jointly with the CONTRACTOR, based on availability of work fronts and the joint construction programme as per 10.2 above. The CONTRACTOR shall scrupulously adhere to these targets /programmes by deploying adequate personnel, construction tools and tackles and he shall also supply himself all materials of his scope of supply in good time to achieve the targets/programmes. In all matters concerning the extent of targets set out in the weekly and monthly programmes and the degree of achievements the decision of the PROJECT-IN-CHARGE will be final and binding on the CONTRACTOR.

## **11 Signing of the Contract:**

11.1 The successful tenderer shall be required to execute an AGREEMENT in the proforma annexed to the TENDER DOCUMENT within 15 days of the receipt by him of the Notification of Acceptance of Tender. In the event of failure to execute the agreement within the stipulated period, the tenderer shall forfeit the Earnest Money Deposit and the employer is free to award the contract to any other tenderer.

## **12 Note to Schedule of Rates:**

12.1 The Schedule of Rates should be read in conjunction with all the other sections of the tender.

12.2 The tenderer shall be deemed to have studied the DRAWINGS, SPECIFICATIONS and details of work to be done within TIME SCHEDULE and to have acquainted himself of the condition prevailing at site.

12.3 All the Rates must be filled as per the Schedule of Rates in original Tender Documents. Rates quoted on separate typed sheets and any variation in item description or specification shall not be accepted. Any exceptions taken by the tenderer to the Schedule of Rates shall be brought out in the terms and conditions of the offer.

12.4 The quantities shown against the various items are only approximate. Any increase or decrease in the quantities shall not form the basis for alteration of the quoted rates.

**12.5 The EMPLOYER reserves the right to interpolate the rates for such items of work falling between similar items of lower and higher magnitude.**

**13 Evaluation of Tenders:**

13.1 Only Those Tenders which are complete in all respects and are strictly in accordance with the Terms and Conditions and Technical Specifications of Tender Document, shall be considered for evaluation. Such Tenders shall be deemed to be under consideration immediately after opening of Tender and until such time an official intimation of acceptance /rejection of Tender is made by CIPET to the Tenderer.

13.2 Zero Deviation: Bidders to note that this is a ZERO DEVIATION TENDER. CIPET will appreciate submission of offer based on the terms and conditions in the enclosed Conditions of Contract, Instructions to Bidders (ITB), Scope of Work, technical specifications etc. Bidder may note that no technical and commercial clarifications will be sought for, after the receipt of the bids. Incase of any deviation/non-conformity observed in the bid, it will summarily be rejected.

**14 Award of Contract:**

14.1 The Acceptance of Tender will be intimated to the successful Tenderer by CIPET either by Telex/ Telegram/ Fax or by Letter.

14.2 CIPET shall have the sole discretion in the matter of award of CONTRACT and the decision of CIPET shall be final and binding.

**15 Clarification of Tender Document:**

A prospective tenderer requiring any clarification of the tender documents is required to attend the pre tendered meeting as mentioned in the tender documents at the date , time and place specified in the tender documents .

**SECTION-IV GENERAL OBLIGATIONS**

**16 Priority of Contract Documents**

16.0 Except if and the extent otherwise provided by the Contract, the provisions of the Terms & Conditions of Contract shall prevail over those of any other documents forming part of the CONTRACT. Several documents forming the CONTRACT are to be taken as mutually explanatory of one another, but in case of ambiguities or discrepancies the same shall be explained and adjusted by the PROJECT-IN-CHARGE who shall thereupon issue to the Contractor instructions thereon and in such event, unless otherwise provided in the Contract, the priority of the documents forming the Contract shall be as follows :

- 1) The Contract Agreement;
- 2) The Letter of Acceptance;
- 3) The (Instructions to Bidders) ITB;
- 4) Terms & Conditions of Contract (TCC)
- 5) Any other document forming part of the Contract.

Works shown in the DRAWING but not mentioned in the SPECIFICATIONS OR described in the SPECIFICATIONS without being shown in the DRAWINGS shall nevertheless be deemed to be included in the same manner as if they had been specifically shown upon the DRAWINGS and described in the SPECIFICATIONS.

**17 Contractor to obtain his own Information:**

The CONTRACTOR in fixing his rate shall for all purposes whatsoever reason may be, deemed to have himself independently obtained all necessary information for the purpose of preparing his tender and his tender as accepted, shall be deemed to have taken into account all contingencies as may arise due to such information or lack of same. The correctness of the details, given in the Tender Document to help the CONTRACTOR to make up the tender is not guaranteed. The CONTRACTOR shall be deemed to have examined the CONTRACT DOCUMENTS, to have generally obtained his own information in all matters whatsoever that might affect the carrying out of the works at the scheduled rates and to have satisfied himself to the sufficiency of his tender. Any error in description of quantity or omission there from shall not vitiate the CONTRACT or release the CONTRACTOR from executing the work comprised in the CONTRACT according to DRAWINGS and SPECIFICATIONS at the scheduled rates. He is deemed to have known the scope, nature and magnitude of the WORKS and the requirements of materials and labour involved etc., and as to what all works he has to complete in accordance with the CONTRACT documents whatever be the defects, omissions or errors that may be found in the DOCUMENTS. The CONTRACTOR shall be deemed to have visited surroundings, to have satisfied himself to the nature of all existing structures, if any, and also as to the nature and the conditions of the Railways, Roads, Bridges and Culverts, means of transport and communication, whether by land, water or air, and as to possible interruptions thereto and the access and egress from the site, to have made enquiries, examined and satisfied himself as to the sites for obtaining sand, stones, bricks and other materials, the sites for disposal of surplus materials, the available accommodation as to whatever required, depots and such other buildings as may be necessary for executing and completing the works, to have made local independent enquiries as to the sub-soil, subsoil water and variations thereof, storms, prevailing winds, climatic conditions and all other similar matters effecting these works. He is deemed to have acquainted himself as to his liability of payment of Government Taxes, Customs duty and other charges, levies etc. Any neglect or omission or failure on the part of the CONTRACTOR in obtaining necessary and reliable information upon the foregoing or any other matters affecting the CONTRACT shall not relieve him from any risks or liabilities or the entire responsibility from completion of the works at the scheduled rates and times in strict accordance with the CONTRACT.

No verbal agreement or inference from conversation with any effect or employee of the EMPLOYER either before, during or after the execution of the CONTRACT agreement shall in any way affect or modify and of the terms or obligations herein contained. Any change in layout

due to site conditions or technological requirement shall be binding on the CONTRACTOR and no extra claim on this account shall be entertained.

**18 Contract Performance Security:**

**18.1 5% of the gross bill amount of RA bills shall be deducted as Deposit/Contract Performance Guarantee which shall be refunded CONTRACTOR after the expiry of DEFECTS LIABILITY PERIOD.**

**19. Time of Performance:**

**19.1 Time for Mobilisation:**

The work covered by this CONTRACT shall be commenced within **fifteen (15) days** including over all completion schedule, the date of letter/Fax of Intent and be completed in stages on or before the dates as mentioned in the TIME SCHEDULE FOR COMPLETION OF WORK. The CONTRACTOR should bear in mind that time is the essence of this agreement. No request for revision/alteration of construction time is entertained after tender opening.

**19.2 Time Schedule of Construction:**

19.2.1 The CONTRACTOR should prepare a detailed monthly or weekly construction program jointly with the PROJECT-IN-CHARGE within 15 days of receipt of LETTER/FAX OF INTENT or ACCEPTANCE OF TENDER. The WORK shall be executed strictly as per the Time Schedule given in the CONTRACT DOCUMENT. The period of construction given includes the time required for mobilization testing, rectifications, if any, retesting and completion in all respects in accordance with CONTRACT DOCUMENT to the entire satisfaction of the PROJECT-IN-CHARGE.

19.2.2 During the performance of the CONTRACT, if in the opinion of the EMPLOYER proper progress is not maintained suitable changes shall be made in the CONTRACTOR's operation to ensure proper progress. The above time schedule shall be reviewed periodically and reports shall be submitted by the CONTRACTOR as directed by EMPLOYER.

**20 Force Majeure:**

**20.1 CONDITIONS FOR FORCE MAJEURE**

In the event of either party being rendered unable by Force Majeure to perform any obligations required to be performed by them under the CONTRACT the relative obligation of the party affected by such Force Majeures shall upon notification to the other party be suspended for the period during which Force Majeures event lasts. The cost and loss sustained by the either party shall be borne by the respective parties. The term "Force Majeures" as employed herein shall mean acts of God, earthquake, war (declared or undeclared), revolts, riots, fires, floods, rebellions, explosions, hurricane, sabotage, civil commotions and acts and regulations of respective Government of the two parties, namely the EMPLOYER and the CONTRACTOR. Upon the occurrence of such cause(s) and upon its termination, the party alleging that it has been rendered unable as aforesaid thereby, shall notify the other party in writing immediately but not later than 72 (Seventy-two) hours of the alleged beginning and ending thereof giving full particulars and satisfactory evidence in support of its claim. Time for performance of the relative obligation suspended by the Force Majeures shall then stand extended by the period for which such cause lasts. If deliveries of bought out items and/or works to be executed by the CONTRACTOR are suspended by Force Majeure conditions lasting for more than 2 (two) months the EMPLOYER shall have the option to terminate the CONTRACT or re-negotiate the contract provisions.

20.2 If the CONTRACT shall be terminated under the provisions of the above clause, the CONTRACTOR shall with all reasonable diligence remove from the SITE all the CONTRACTOR's equipment and shall give similar facilities to his SUB-CONTRACTORS to do so.



**21 Price reduction schedule:**

21.1 Time is the essence of the CONTRACT. In case the CONTRACTOR fails to complete the WORK within the stipulated period, then, unless such failure is due to Force Majeure as defined in Clause 20 here above or due to EMPLOYER's defaults, the Total Contract price shall be **reduced by ½ % of the total Contract Price per complete week of delay or part thereof subject to a maximum of 5 % of the Total Contract Price**, by way of reduction in price for delay and not as penalty. The EMPLOYER may deduct the said amount from payments due to the CONTRACTOR or the said amount will be recovered from amount due to the Contractor/ Contractor's Contract Performance Security payable on demand. The decision of the PROJECT-IN-CHARGE in regard to applicability of Price Reduction Schedule shall be final and binding on the CONTRACTOR.

**22 Rights of the employer to forfeit security deposit/contract performance security:**

22.1 Whenever any claim against the CONTRACTOR for the payment of a sum of money arises out or under the CONTRACT, the EMPLOYER shall be entitled to recover such sum by appropriating in part or whole the Contract Performance Security of the CONTRACTOR. In the event of the security being insufficient or if no security has been taken from the CONTRACTOR, then the balance or the total sum recoverable, as the case may be shall be deducted from any sum then due or which at any time thereafter may become due to the CONTRACTOR. The CONTRACTOR shall pay to the EMPLOYER on demand any balance remaining due.

**23 Failure by the contractor to comply with the provisions of the contract:**

23.1 If the CONTRACTOR refuses or fails to execute the WORK or any separate part thereof with such diligence as will ensure its completion within the time specified in the CONTRACT or extension thereof or fails to perform any of his obligation under the CONTRACT or in any manner commits a breach of any of the provisions of the CONTRACT it shall be open to the EMPLOYER at its option by written notice to the CONTRACTOR:

a) TO DETERMINE THE CONTRACT in which event the CONTRACT shall stand terminated and shall cease to be in force and effect on and from the date appointed by the EMPLOYER on that behalf, whereupon the CONTRACTOR shall stop forthwith any of the CONTRACTOR's work then in progress, except such WORK as the EMPLOYER may, in writing, require to be done to safeguard any property or WORK, or installations from damage, and the EMPLOYER, for its part, may take over the work remaining unfinished by the CONTRACTOR and complete the same through a fresh contractor or by other means, at the risk and cost of the CONTRACTOR, and any of his sureties if any, shall be liable to the EMPLOYER for any excess cost occasioned by such work having to be so taken over and completed by the EMPLOYER over and above the cost at the rates specified in the schedule of quantities and rate/prices.

b) WITHOUT DETERMINING THE CONTRACT to take over the work of the CONTRACTOR or any part thereof and complete the same through a fresh contractor or by other means at the risk and cost of the CONTRACTOR. The CONTRACTOR and any of his sureties are liable to the EMPLOYER for any excess cost over and above the cost at the rates specified in the Schedule of Quantities/ rates, occasioned by such works having been taken over and completed by the EMPLOYER.

**23.2 In such events of Clause 23.1(a) or (b) above.**

a) The whole or part of the Contract Performance Security furnished by the CONTRACTOR is liable to be forfeited without prejudice to the right of the EMPLOYER to recover from the CONTRACTOR the excess cost referred to in the sub-clause aforesaid, the EMPLOYER shall also have the right of taking possession and utilising in completing the works or any part thereof, such as materials equipment and plants available at work site belonging to the

CONTRACTOR as may be necessary and the CONTRACTOR shall not be entitled for any compensation for use or damage to such materials, equipment and plant.

b) The amount that may have become due to the CONTRACTOR on account of work already executed by him shall not be payable to him until after the expiry of Six (6) calendar months reckoned from the date of termination of CONTRACT or from the taking over of the WORK or part thereof by the EMPLOYER as the case may be, during which period the responsibility for faulty materials or workmanship in respect of such work shall, under the CONTRACT, rest exclusively with the CONTRACTOR. This amount shall be subject to deduction of any amounts due from the CONTRACT to the EMPLOYER under the terms of the CONTRACT authorised or required to be reserved or retained by the EMPLOYER.

23.3 Before determining the CONTRACT as per Clause 23.1(a) or (b) provided in the judgment of the EMPLOYER, the default or defaults committed by the CONTRACTOR is/are curable and can be cured by the CONTRACTOR if an opportunity given to him, then the EMPLOYER may issue Notice in writing calling the CONTRACTOR to cure the default within such time specified in the Notice.

23.4 The EMPLOYER shall also have the right to proceed or take action as per 23.1(a) or (b) above, in the event that the CONTRACTOR becomes bankrupt, insolvent, compounds with his creditors, assigns the CONTRACT in favour of his creditors or any other person or persons, or being a company or a corporation goes into voluntary liquidation, provided that in the said events it shall not be necessary for the EMPLOYER to give any prior notice to the CONTRACTOR.

23.5 Termination of the CONTRACT as provided for in sub- clause 23.1(a) above shall not prejudice or affect their rights of the EMPLOYER which may have accrued upto the date of such termination.

#### **24 Contractor remains liable to pay compensation if**

24.1 In any case in which any of the powers conferred upon the EMPLOYER BY CLAUSE 23.0 thereof shall have become action not taken under clause 23.0: exercisable and the same had not been exercised, the non-exercise thereof shall not constitute a waiver of any of the conditions hereof and such powers shall notwithstanding be exercisable in the event of any further case of default by the CONTRACTOR for which by any clause or clauses hereof he is declared liable to pay compensation amounting to the whole of his Contract Performance Security, and the liability of the CONTRACTOR for past and future compensation shall remain unaffected. In the event of the EMPLOYER putting in force the power under above sub-clause (a) or (b) vested in him under the preceding clause he may, if he so desired, take possession of all or any tools, and plants, materials and stores in or upon the works or the site thereof belonging to the CONTRACTOR or procured by him and intended to be used for the execution of the WORK or any part thereof paying or allowing for the same in account at the CONTRACT rates or in case of these not being applicable at current market rates to be certified by the PROJECT-IN-CHARGE whose certificate thereof shall be final, otherwise the PROJECT-IN- CHARGE may give notice in writing to the CONTRACTOR or his clerk of the works, foreman or other authorised agent, requiring him to remove such tools, plant, materials or stores from the premises (within a time to be specified in such notice), and in the event of the CONTRACTOR failing to comply with any such requisition, the PROJECT-IN-CHARGE may remove them at the CONTRACTOR's expense or sell them by auction or private sale on account of the CONTRACTOR and at his risk in all respects without any further notice as to the date, time or place of sale and the certificate of the PROJECT-IN-CHARGE as to the expenses of any such removal and the amount of the proceeds and expenses of any such sale shall be final and conclusive against the CONTRACTOR.

**25 Change in constitution:**

25.1 Where the CONTRACTOR is a partnership firm, the prior approval of the EMPLOYER shall be obtained in writing, before any change is made in the constitution of the firm. Where the CONTRACTOR is an individual or a Hindu undivided family business concern, such approval as aforesaid shall, likewise be obtained before such CONTRACTOR enters into any agreement with other parties, where under, the reconstituted firm would have the right to carry out the work hereby undertaken by the CONTRACTOR. In either case if prior approval as aforesaid is not obtained, the CONTRACT shall be deemed to have been allotted in contravention of **clause 23** hereof and the same action may be taken and the same consequence shall ensure as provided in the said clause.

**26 Termination of Contract**

26.1 **TERMINATION OF CONTRACT FOR DEATH:** If the CONTRACTOR is an individual or a proprietary concern and the individual or the proprietor dies or if the CONTRACTOR is a partnership concern and one of the partner dies then unless, the EMPLOYER is satisfied that the legal representative of the individual or the proprietary concern or the surviving partners are capable of carrying out and completing CONTRACT, he (the EMPLOYER) is entitled to cancel the CONTRACT for the uncompleted part without being in any way liable for any compensation payment to the estate of the deceased CONTRACTOR and/or to the surviving partners of the CONTRACTOR'S firm on account of the cancellation of CONTRACT. The decision of the EMPLOYER in such assessment shall be final and binding on the parties. In the event of such cancellation, the EMPLOYER shall not hold the estate of the deceased CONTRACTOR and/or the surviving partners of the CONTRACTOR'S firm liable for any damages for non-completion of CONTRACT.

**26.2 Termination of Contract in case of Liquidation / Bankruptcy etc.**

If the Contractor shall dissolve or become bankrupt or insolvent or cause or suffer any receiver to be appointed of his business of any assets thereof compound with his Creditors, or being a corporation commence to be wound up, not being a member's voluntary winding up for the purpose of amalgamation or reconstruction, or carry on its business under a Receiver for the benefits of its Creditors any of them, EMPLOYER shall be at liberty :- To terminate the contract forthwith upon coming to know of the happening of any such event as aforesaid by notice in writing to the Contractor or to give the Receiver or liquidator or other person, the option of carrying out the contract subject to his providing a guarantee upto an amount to be agreed upon by EMPLOYER for due and faithful performance of the contract.

**26.3 Termination of Contract for Non-Performance and subsequently putting the Contractor on Holiday**

In case of termination of CONTRACT herein set forth (under clause 23.0) except under conditions of Force Majeure and termination after expiry of contract, the CONTRACTOR shall be put under holiday [i.e. neither any enquiry will be issued to the party by EMPLOYER against any type of tender nor their offer will be considered by CIPET against any ongoing tender (s) where contract between CIPET and that particular CONTRACTOR (as a bidder) has not been finalized] for **three years** from the date of termination by EMPLOYER to such CONTRACTOR.

**27 Contractor's office at site:**

27.1 The CONTRACTOR shall provide and maintain an office at the site for the accommodation of his agent and staff and such office shall be open at all reasonable hours to receive instructions, notice or other communications. The CONTRACTOR at all time shall maintain a site instruction book and compliance of these shall be communicated to the PROJECT-IN CHARGE from time to time and the whole document to be preserved and handed over after completion of works.

**27.2 Security & Protection:**

- a). The contractor shall at his cost, provide any necessary enclosures, gates, entrances etc., for the protection of the work and materials and for altering and adapting same as may be required and removing at completion of the works and making good all works disturbed.
- b). During inclement weather the contractor shall suspend concreting or plastering for such time as the EMPLOYER may direct and shall protect such work in course of execution from damage by approved measures
- c). Should the work be suspended by reason of rain, strike, lock outs or any other cause, the contractor shall at his cost take all precautions necessary for the protection of the work and shall make good any damage arising from any of these causes.
- d). The contractor shall at his expense cover up and protect from injury from any cause, all new work and supply all temporary doors protection to windows, and any other requisite protection for the whole work executed, whether by himself or special tradesmen of Sub-Contractors and any damage caused must be made good by the contractor at his own expense.
- e). All fences trees, shrubs, grasses, lawn and other surfaces around the buildings or approaches there to, which are required to be maintained are to be kept free from damage due to operations in connection with the work, at Contractor's expense.
- f). The contractor shall, at his expense, protect all projecting sills, jambs, copings, stone or concrete treads and moldings and all concrete steps, wood work and joinery and the like from injury during the progress of the work, by rough timber casings securely fixed.

**27.3 Objects of value and antiquity found on site:**

All Objects of value, or antiquity found on the site shall remain the property of EMPLOYER and such findings shall be immediately reported to the EMPLOYER.

**27.4 Useful Excavated Materials:**

- a). Any sand, gravel, muhurrum or rock taken from excavation will remain the property of the Employer and in the event of it not being allowed to use in the work, the Employer reserves the right to dispose it off in any way he wishes or to direct the Contractor to cart it away as excavated materials
- b). Should suitable sand or gravel muhurrum or rock be found in the excavations and the contractor be allowed to use the same in the work, in place of materials to be brought by him from outside he will be required to pay the Employer the full market value of the same.

**27.5 Measurement of all concealed items to be recorded prior to covering up**

Measurements of all items of work including extra items if any, such as work in foundations including excavations plinth filling, masonry concrete etc., Steel in all RCC Work, pipe to be encased etc., shall be got recorded from the Employer or his authorized Site Supervisor before they are covered up.

**28 Contractor's subordinate staff and their conduct**

28.1 The CONTRACTOR, on or after award of the WORK shall name and depute a qualified engineer having sufficient experience in carrying out work of similar nature, to whom the equipments, materials, if any, shall be issued and instructions for works given. The CONTRACTOR shall also provide to the satisfaction of the PROJECT-IN- CHARGE sufficient and qualified staff to superintend the execution of the WORK, competent sub-agents, foremen and leading hands including those specially qualified by previous experience to supervise the types of works comprised in the CONTRACT in such manner as will ensure work of the best quality, expeditious working. Whenever in the opinion of the PROJECT-IN- CHARGE

additional properly qualified supervisory staff is considered necessary, they shall be employed by the CONTRACTOR without additional charge on accounts thereof. The CONTRACTOR shall ensure to the satisfaction of the PROJECT-IN-CHARGE that SUB- CONTRACTORS, if any, shall provide competent and efficient supervision, over the work entrusted to them.

28.2 The CONTRACTOR shall be responsible for the proper behavior of all the staff, foremen, workmen, and others, and shall exercise a proper degree of control over them and in particular and without prejudice to the said generality, the CONTRACTOR shall be bound to prohibit and prevent any employees from trespassing or acting in any way detrimental or prejudicial to the interest of the community or of the properties or occupiers of land and properties in the neighborhood and in the event of such employee so trespassing, the CONTRACTOR shall be responsible therefore and relieve the EMPLOYER of all consequent claims or actions for damages or injury or any other grounds whatsoever. The decision of the PROJECT-IN-CHARGE upon any matter arising under this clause shall be final. The CONTRACTOR shall be liable for any liability to EMPLOYER on account of deployment of CONTRACTOR's staff etc. or incidental or arising out of the execution of CONTRACT.

The CONTRACTOR shall be liable for all acts or omissions on the part of his staff, Foremen and Workmen and others in his employment, including misfeasance or negligence of whatever kind in the course of their work or during their employment, which are connected directly or indirectly with the CONTRACT.

## **29 Sub-letting of works:**

29.1 No part of the CONTRACT nor 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 whatsoever without the consent in writing, of the EMPLOYER except as provided for in the succeeding sub-clause.

i ) **SUB-CONTRACTS FOR TEMPORARY WORKS ETC.:** The EMPLOYER may give written consent to Sub- contract for the execution of any part of the WORK at the site, being entered in to by CONTRACTOR provided each individual Sub- contract is submitted to the PROJECT-IN-CHARGE before being entered into and is approved by him.

ii) **LIST OF SUB-CONTRACTORS TO BE SUPPLIED:** At the commencement of every month the CONTRACTOR shall furnish to the PROJECT-IN- CHARGE list of all SUB-CONTRACTORS or other persons or firms engaged by the CONTRACTOR and working at the SITE during the previous month with particulars of the general nature of the Subcontract or works done by them.

iii) **CONTRACTOR'S LIABILITY NOT LIMITED BY SUB- CONTRACTORS:** Notwithstanding any sub-letting with such approval as aforesaid and notwithstanding that the PROJECT-IN-CHARGE shall have received copies of any Subcontracts, the contractor shall be and shall remain solely responsible for the quality, proper and expeditious execution of the Contract in all respects as if such sub-letting or Subcontracting had not taken place, and as if such work had been done directly by the CONTRACTOR. The CONTRACTOR shall bear all responsibility for any act or omission on the part of sub-contractors in regard to work to be performed under the CONTRACT.

iv) **EMPLOYER MAY TERMINATE SUB-CONTRACTS: If any SUB-CONTRACTOR engaged upon the works at the site executes any works which in the opinion** of the PROJECT-IN-CHARGE is not in accordance with the CONTRACT documents, the EMPLOYER may by written notice to the CONTRACTOR request him to terminate such subcontract and the CONTRACTOR upon the receipt of such notice shall terminate such Subcontract and dismiss the SUB-CONTRACTOR(S) and the later shall forthwith leave the works, failing which the EMPLOYER shall have the right to remove such SUB-CONTRACTOR(S) from the site.

v) **NO REMEDY FOR ACTION TAKEN UNDER THIS CLAUSE:** No action taken by the EMPLOYER under the clause shall relieve the CONTRACTOR of any of his liabilities under the CONTRACT or give rise to any right or compensation, extension of time or otherwise failing which the EMPLOYER shall have the right to remove such SUB-CONTRACTOR(S) from the site.

**30 Power of entry:**

30.1 If the CONTRACTOR shall not commence the WORK in the manner previously described in the CONTRACT documents or if he shall at any time in the opinion of the PROJECT-IN-CHARGE.

- i) fail to carry out the WORK in conformity with the CONTRACT documents, or
- ii) fail to carry out the WORK in accordance with the Time Schedule, or
- iii) substantially suspend work or the WORK for a period of fourteen days without authority from the PROJECT-IN-CHARGE, or
- iv) fail to carry out and execute the WORK to the satisfaction of the PROJECT-IN-CHARGE, or
  - v) fail to supply sufficient or suitable construction plant, temporary works, labour, materials or things, or
  - vi) Commit, suffer, or permit any other breach of any of the provisions of the CONTRACT on his part to be performed or observed or persist in any of the above mentioned breaches of the CONTRACT for fourteen days, after notice in writing shall have been given to the CONTRACTOR by the PROJECT-IN-CHARGE requiring such breach to be remedied, or
- vii) if the CONTRACTOR shall abandon the WORK , or
- viii) If the CONTRACTOR during the continuance of the CONTRACT shall become bankrupt, make any arrangement or composition with his creditors, or permit any execution to be levied or go into liquidation whether compulsory or voluntary not being merely a voluntary liquidation for the purpose of amalgamation or reconstruction then in any such case, the EMPLOYER shall have the power to enter upon the WORK and take possession thereof and of the materials, temporary WORK, construction plant, and stock thereon, and to revoke the CONTRACTOR's license to use the same, and to complete the WORK by his agents, other CONTRACTORS or workmen or to relate the same upon any terms and to such other person, firm or corporation as the EMPLOYER in his absolute discretion may think proper to employ and for the purpose aforesaid to use or authorise the use of any materials, temporary work, CONSTRUCTION PLANT, and stock as aforesaid, without making payment or allowance to the CONTRACTOR for the said materials other than such as may be certified in writing by the PROJECT-IN-CHARGE to be reasonable, and without making any payment or allowance to the CONTRACTOR for the use of the temporary said works, construction plant and stock or being liable for any loss or damage thereto, and if the EMPLOYER shall by reason of his taking possession of the WORK or of the WORK being completed by other CONTRACTOR (due account being taken of any such extra work or works which may or be omitted) then the amount of such excess as certified by the PROJECT-IN-CHARGE shall be deducted from any money which may be due for work done by the CONTRACTOR under the CONTRACT and not paid for. Any deficiency shall forthwith be made good and paid to the EMPLOYER by the CONTRACTOR and the EMPLOYER shall have power to sell in such manner and for such price as he may think fit all or any of the construction plant, materials etc. constructed by or belonging to and to recoup and retain the said deficiency or any part thereof out of proceeds of the sale.

**31 Other agencies at site:**

31.1 The CONTRACTOR shall have to execute the WORK in such place and conditions where other agencies will also be engaged for other works such as site grading, filling, and leveling, electrical and mechanical engineering works, etc. No claim shall be entertained due to WORK being executed in the above circumstances.

**32 Notice:**

32.1 TO THE CONTRACTOR: Any notice hereunder may be served on the CONTRACTOR or his duly authorised representative at the job site or may be served by registered mail direct to the address furnished by the CONTRACTOR. Proof of issue of any such notice could be conclusive of the CONTRACTOR having been duly informed of all contents therein.

**33 Right of various interests:**

- 33.1 i) The EMPLOYER reserves the right to distribute the work between more than one agency(ies). The CONTRACTOR shall cooperate & provide other agency(ies) reasonable opportunity for access to the WORK for the carriage and storage of materials and execution of their works.
- ii) Wherever the work being done by any department of the EMPLOYER or by other agency(ies) employed by the EMPLOYER is contingent upon WORK covered by this CONTRACT, the respective

rights of the various interests involved shall be determined by the PROJECT-IN-CHARGE to secure the completion of the various portions of the work in general harmony.

**34 Royalties:**

34.1 All charges on account of royalty, tollage, rent, octroi terminal or sales tax and/or other duties or any other levy on materials obtained for the work or temporary work or part thereof (excluding materials provided by the EMPLOYER) shall be borne by the CONTRACTOR.

34.2 The CONTRACTOR shall not sell or otherwise dispose of or remove except for the purpose of this CONTRACT, the sand, stone, clay, ballast, earth, rock or other substances, or materials obtained from any excavation made for the purpose of the WORK or any building or produce upon the site at the time of delivery of the possession thereof, but all such substances, materials, buildings and produce shall be the property of the EMPLOYER provided that the CONTRACTOR may with the permission of the PROJECT-IN-CHARGE, use the same for the purpose of the work by payment of cost of the same at such a rate as may be determined by the PROJECT-IN-CHARGE.

**35 Liens:**

35.1 If, at any time there should be evidence or any lien or claim for which the EMPLOYER might have become liable and which is chargeable to the CONTRACTOR, the EMPLOYER shall have the right to retain out of any payment then due or thereafter to become due an amount sufficient to completely indemnify the EMPLOYER against such lien or claim and if such lien or claim be valid, the EMPLOYER may pay and discharge the same and deduct the amount so paid from any money which may be or may become due and payable to the CONTRACTOR. If any lien or claim remain unsettled after all payments are made, the CONTRACTOR shall refund or pay to the EMPLOYER all money that the latter may be compelled to pay in discharging such lien or claim including all costs and reasonable expenses. EMPLOYER reserves the right to do the same.

35.2 The EMPLOYER shall have lien on all materials, equipments including those brought by the CONTRACTOR for the purpose of erection, testing and commissioning of the WORK.

35.3 The final payment shall not become due until the CONTRACTOR delivers to the PROJECT-IN-CHARGE a complete release or waiver of all liens arising or which may arise out of his agreement or receipt in full or certification by the CONTRACTOR in a form approved by PROJECT-IN-CHARGE that all invoices for labour, materials, services have been paid in lien thereof and if required by the PROJECT-IN-CHARGE in any case an affidavit that so far as the CONTRACTOR has knowledge or information the releases and receipts include all the labour and material for which a lien could be filled.

**36 Delays by employer or his authorised agents:**

36.1 In case the CONTRACTOR's performance is delayed due to any act or omission on the part of the EMPLOYER or his authorised agents, then the CONTRACTOR shall be given due **extension of time** for the completion of the WORK, to the extent such omission on the part of the EMPLOYER has caused delay in the CONTRACTOR's performance of his WORK.

36.2 No adjustment in CONTRACT PRICE shall be allowed for reasons of such delays and extensions granted except as provided in TENDER DOCUMENT, where the EMPLOYER reserves the right to seek indulgence of CONTRACTOR to maintain the agreed Time Schedule of Completion. In such an event the CONTRACTOR shall be obliged for working by

CONTRACTOR's personnel for additional time beyond stipulated working hours as also Sundays and Holidays and achieve the completion date/interim targets.

**37 Payment if the contract is terminated:**

37.1 If the CONTRACT shall be terminated as per Tender pursuant to Clause no. 23 of TCC, the CONTRACTOR shall be paid by the EMPLOYER in so far as such amounts or items shall not have already been covered by payments of amounts made to the CONTRACTOR for the WORK executed and accepted by PROJECT-IN-CHARGE prior to the date of termination at the rates and prices provided for in the CONTRACT and in addition to the following:

a) The amount payable in respect of any preliminary items, so far as the Work or service comprised therein has been carried out or performed and an appropriate portion as certified by PROJECT-IN-CHARGE of any such items or service comprised in which has been partially carried out or performed.

b) Any other expenses which the CONTRACTOR has expended for performing the WORK under the CONTRACT subject to being duly recommended by PROJECT-IN-CHARGE and approved by EMPLOYER for payment, based on documentary evidence of his having incurred such expenses.

37.2 The CONTRACTOR will be further required to transfer the title and provide the following in the manner and as directed by the EMPLOYER.

a) Any and all completed works.

b) Such partially completed WORK including drawings, information and CONTRACT rights as the CONTRACTOR has specially performed, produced or acquired for the performance of the CONTRACTOR.

**38 No waiver of rights:**

38.1 Neither the inspection by the EMPLOYER or any of their officials, employees, or agents nor any order by the EMPLOYER for payment of money or any payment for or acceptance of the whole or any part of the Work by the EMPLOYER nor any extension of time, nor any possession taken by EMPLOYER shall operate as a waiver of any provision of the CONTRACT, or of any power herein reserved to the EMPLOYER, or any right to damages herein provided, nor shall any waiver of any breach in the CONTRACT be held to be a waiver of any other subsequent breach.

**39 Certificate not to affect right of employer and liability of contractor:**

39.1 No interim payment certificate(s) issued by the Project-in-Charge of the EMPLOYER, nor any sum paid on account by the EMPLOYER, nor any extension of time for execution of the work granted by EMPLOYER shall affect or prejudice the rights of the Employer against the CONTRACTOR or relieve the CONTRACTOR of his obligations for the due performance of the CONTRACT, or be interpreted as approval of the WORK done or of the equipment supplied and no certificate shall create liability for the EMPLOYER to pay for alterations, amendments, variations or additional works not ordered, in writing, by EMPLOYER or discharge the liability of the CONTRACTOR for the payment of damages whether due, ascertained, or certified or not or any sum against the payment of which he is bound to indemnify the EMPLOYER.

**40 Language and measures:**

40.1 All documents pertaining to the CONTRACT including Specifications, Schedules, Notices, Correspondence, operating and maintenance Instructions, DRAWINGS, or any other writing shall be written in **English language. The Metric System** of measurement shall be used in the CONTRACT unless otherwise specified.

**41 Transfer of title:**

41.1 The title of Ownership of supplies furnished by the CONTRACTOR shall not pass on to the EMPLOYER for all Supplies till the same are finally accepted by the EMPLOYER after the successful completion of PERFORMANCE TEST and GUARANTEE TEST and issue of FINAL CERTIFICATE.



41.2 However, the EMPLOYER shall have the lien on all such works performed as soon as any advance or progressive payment is made by the EMPLOYER to the CONTRACTOR and the CONTRACTOR shall not subject these works for use other than those intended under this CONTRACT.

**42 Brand names:**

42.1 The specific reference in the SPECIFICATIONS and documents to any material by trade name, make or catalogue number shall be construed as establishing standard or quality and performance and not as limited competition. However, TENDERER may offer other similar equipments provided it meets the specified standard design and performance requirements.

**SECTION-V : PERFORMANCE OF WORK**

**43 Execution of work:**

43.1 All the Works shall be executed in strict conformity with the provisions of the CONTRACT Documents and with such explanatory detailed drawings, specification and instructions as may be furnished from time to time to the CONTRACTOR by the PROJECT-IN-CHARGE whether mentioned in the CONTRACT or not. The CONTRACTOR shall be responsible for ensuring that works throughout are executed in the most substantial, proper and workmanlike manner with the quality of material and workmanship in strict accordance with the SPECIFICATIONS and to the entire satisfaction of the PROJECT-IN-CHARGE. The CONTRACTOR shall provide all necessary materials, equipment, labour etc. for execution and maintenance of WORK till completion unless otherwise mentioned in the CONTRACT.

**44 Co-ordination and inspection of work:**

44.1 The coordination and inspection of the day-to-day work under the CONTRACT shall be the responsibility of the ARCHITECT and the EMPLOYER. The written instruction regarding any particular job will normally be passed by the ARCHITECT/EMPLOYER or their authorised representative.

A work order book will be maintained by the CONTRACTOR for each sector in which the aforesaid written instructions will be entered. These will be signed by the CONTRACTOR or his authorised representative by way of acknowledgement within 12 hours.

**45 General conditions for construction and erection work:**

45.1 The working time at the site of work is 48 hours per week. For carrying out work beyond working hours the CONTRACTOR will approach the PROJECT-IN-CHARGE or his authorised representative and obtain his prior written permission. No extra claims will be entertained by the EMPLOYER on this account.

45.2 The CONTRACTOR must arrange for the placement of workers in such a way that the delayed completion of the WORK or any part thereof for any reason whatsoever will not affect their proper employment. The EMPLOYER will not entertain any claim for idle time payment whatsoever.

45.3 The CONTRACTOR shall submit to the EMPLOYER reports at regular intervals regarding the state and progress of WORK in the prescribed formats. The details and proforma of the report will mutually be agreed after the award of CONTRACT. The CONTRACTOR shall provide display boards showing progress and labour strengths at worksite, as directed by the PROJECT-IN-CHARGE.

**46 Alterations in specifications, design and extra works:**

46.1 The WORK covered under this CONTRACT having to be executed by the CONTRACTOR on a lumpsum firm price/item rate quoted by him, the EMPLOYER will not accept any proposals for changes in VALUE OF CONTRACT or extension in time on account of any such changes which may arise to the CONTRACTOR's scope of WORK as a result of detailed Engineering and thereafter during the execution of WORK. The only exception to this will be a case where the EMPLOYER requests in writing to the CONTRACTOR to upgrade the SPECIFICATIONS or the size of any major pieces of equipments, plant or machinery beyond what is normally required to meet the scope of WORK as defined in the CONTRACT DOCUMENT. In such cases, a change order will be initiated by the CONTRACTOR at the appropriate time for the EMPLOYER's prior approval giving the full back-up data for their review and for final settlement of any impact on price within 30 (thirty) days thereafter.

46.2 The PROJECT-IN-CHARGE shall have to make any alterations in, omission from, additions to or substitutions for, the Schedule of Rates, the original specifications, drawings, designs and instructions that may appear to him to be necessary or advisable during the progress of the WORK and the CONTRACTOR shall be bound to carry out the such altered/ extra/ new items of WORK (upto 100% of the stated quantities in SOR/BOQ) in accordance with any instructions which may be given to him in writing signed by the PROJECT-IN- CHARGE, and such alterations, omissions, additions or substitutions shall not invalidate the CONTRACT and any altered, additional or substituted work which the CONTRACTOR may be directed to do in the manner above specified as part of the WORK shall be carried out by the CONTRACTOR on the same conditions in all respects on which he agreed to do the main WORK. The time of completion of WORK may be extended for the part of the particular job at the discretion of the PROJECT-IN- CHARGE, for only such alterations, additions or substitutions of the WORK, as he may consider as just and reasonable. The rates for such additional, altered or substituted WORK under this clause shall be worked out in accordance with the following provisions:-

a) If the rates for the additional, altered or substituted WORK are specified in the CONTRACT for the WORK, the CONTRACTOR is bound to carry on the additional, altered or substituted WORK at the same rates as are specified in the CONTRACT.

b) If the rates for the additional, altered or substituted WORK are not specifically provided in the CONTRACT for the WORK, the rates will be derived from the rates for similar class of WORK as are specified in the CONTRACT for the WORK. The opinion of the PROJECT-IN-CHARGE, as to whether or not the rates can be reasonably so derived from the items in this CONTRACT will be final and binding on the CONTRACTOR.

c) If the rates for the altered, additional or substituted WORK cannot be determined in the manner specified in sub-clause(s) and (b) above, then the CONTRACTOR shall, within 7 days from the date of receipt of order to carry out the WORK, inform the PROJECT-IN-CHARGE of the rates with his intention to charge for such class of WORK, supported by the rate analysis or rates claimed, and the PROJECT-IN-CHARGE shall determine the rate or rates on the basis of the prevailing market rates, labour cost at schedule of labour rates plus 10% to cover contractor's supervision, overheads and profit and pay the CONTRACTOR accordingly. The opinion of the PROJECT- IN-CHARGE as to current market rates of materials and the quantum of labour involved per unit of measurement will be final and binding on the CONTRACTOR.

d) Where the item of work will be executed through nominated specialist agency as approved by the PROJECT-IN-CHARGE, then the actual amount paid to such nominated agency supported by documentary evidence and as certified by PROJECT-IN-CHARGE shall be considered plus 10% (ten percent) to cover all contingencies, overhead, profits to arrive at the rates.

**47 Drawings to be supplied by the employer**

47.1 The drawings attached with tender are only for the general guidance to the CONTRACTOR to enable him to visualize the type of work contemplated and scope of work involved. The

CONTRACTOR will be deemed to have studied the DRAWINGS and formed an idea about the WORK involved.

47.2 Detailed working drawings on the basis of which actual execution of the WORK is to proceed, will be furnished from time to time during the progress of the work. The CONTRACTOR shall be deemed to have gone through the DRAWINGS supplied to him thoroughly and carefully and in conjunction with all other connected drawings and bring to the notice of the PROJECT-IN-CHARGE discrepancies, if any, therein before actually carrying out the Work.

47.3 Copies of all detailed working drawings relating to the WORK shall be kept at the CONTRACTOR's office on the site and shall be made available to the PROJECT-IN-CHARGE at any time during the CONTRACT. The drawings and other documents issued by the EMPLOYER shall be returned to the EMPLOYER on completion of the WORK, as they are being the sole property of the EMPLOYER.

#### **48 Setting out works:**

48.1 The EMPLOYER shall furnish the CONTRACTOR with only the four corners of the Works site and a level bench mark and the CONTRACTOR shall set out the Works and shall provide an efficient staff for the purpose and shall be solely responsible for the accuracy of such setting out.

48.2 The CONTRACTOR shall provide, fix and be responsible for the maintenance of all stakes, templates, level marks, profiles and other similar things and shall take all necessary precautions to prevent their removal or disturbance and shall be responsible for the consequence of such removal or disturbance should the same take place and for their efficient and timely reinstatement. The CONTRACTOR shall also be responsible for the maintenance of all existing survey marks, boundary marks, distance marks and center line marks, either existing or supplied and fixed by the CONTRACTOR. The work shall be set out to the satisfaction of the EMPLOYER. The approval there of joining with the CONTRACTOR by the EMPLOYER in setting out the work, shall not relieve the CONTRACTOR of any of his responsibility.

48.3 Before beginning the Works, the CONTRACTOR shall at his own cost, provide all necessary reference and level posts, pegs, bamboos, flags, ranging rods, strings and other materials for proper layout of the works in accordance with the schemes for bearing marks acceptable to the EMPLOYER. The center, longitudinal or face lines and cross lines shall be marked by means of small masonry pillars. Each pillar shall have distinct mark at the centre to enable theodolite to be set over it. No work shall be started until all these points are checked and approved by the EMPLOYER in writing but such approval shall not relieve the CONTRACTOR of any of his responsibilities. The CONTRACTOR shall also provide all labour, material and other facilities, as necessary, for the proper checking of layout and inspection of the points during construction.

48.4 Pillars bearing geodetic marks located at the sites of units of WORKS under construction should be protected by the CONTRACTOR.

**48.5 On completion of WORK, the CONTRACTOR must submit the geodetic documents according to which the WORK was carried out.**

#### **49 Responsibility for level and alignment:**

49.1 The CONTRACTOR shall be entirely and exclusively responsible for the horizontal and vertical alignment, the levels and correctness of every part of the WORK and shall rectify effectively any errors or imperfections therein; such rectifications shall be carried out by the CONTRACTOR, at his own cost, when instructions are issued to that effect by the EMPLOYER

**50 Materials to be supplied by contractor:**

50.1 The CONTRACTOR shall procure and provide within the VALUE OF CONTRACT the whole of the materials required for the construction including steels, cement and other building materials, tools, tackles, construction plant and equipment for the completion and maintenance of the WORK except the materials which will be issued by the EMPLOYER and shall make his own arrangement for procuring such materials and for the transport thereof. The EMPLOYER may give necessary recommendation to the respective authority if so desired by the CONTRACTOR but assumes no further responsibility of any nature. The EMPLOYER will insist on the procurement of materials which bear ISI stamp and/or which are supplied by reputed suppliers.

50.2 The CONTRACTOR shall properly store all materials brought by him to the SITE to prevent damages due to rain, wind, direct exposure to sun, etc. as also from theft, pilferage, etc. for proper and speedy execution of his works. The CONTRACTOR shall maintain sufficient stocks of all materials required by him.

50.3 No material shall be dispatched from the CONTRACTOR's stores before obtaining the approval in writing of the PROJECT-IN-CHARGE.

**51 Discrepancies between instructions:**

51.1 Should any discrepancy occur between the various instructions furnished to the CONTRACTOR, his agent or staff or any doubt arises as to the meaning of any such instructions or should there be any misunderstanding between the CONTRACTOR's staff and the PROJECT-IN-CHARGE's staff, the CONTRACTOR shall refer the matter immediately in writing to the PROJECT-IN-CHARGE whose decision thereon shall be final and conclusive and no claim for losses alleged to have been caused by such discrepancies between instructions, doubts, or misunderstanding shall in any event be admissible.

**52 Action where no specification is issued:**

52.1 In case of any class of WORK for which there is no SPECIFICATION supplied by the EMPLOYER as mentioned in the Tender Documents such WORK shall be carried out in accordance with Indian Standard Specifications and if the Indian Standard Specifications do not cover the same, the WORK should be carried out as per standard Engineering Practice subject to the approval of the PROJECT-IN-CHARGE.

**53 Inspection of works:**

53.1 The PROJECT-IN-CHARGE will have full power and authority to inspect the WORK at any time wherever in progress either on the SITE or at the CONTRACTOR's premises/workshops wherever situated, premises/ workshops of any person, firm or corporation where WORK in connection with the CONTRACT may be in hand or where materials are being or are to be supplied, and the CONTRACTOR shall afford or procure for the PROJECT-IN-CHARGE every facility and assistance to carry out such inspection.

53.2 The CONTRACTOR is to provide at all time during the progress of the WORK and the maintenance period, proper means of access with ladders, gangways etc. and the necessary attendance to move and adopt as directed for inspection or measurements of the WORK by the PROJECT-IN-CHARGE.

53.3 The CONTRACTOR shall make available to the PROJECT-IN-CHARGE free of cost all necessary instruments and assistance in checking or setting out of WORK and in the checking of any WORK made by the CONTRACTOR for the purpose of setting out and taking measurements of WORK.

**54 Tests for quality of work:**

54.1 All workmanship shall be of the respective kinds described in the CONTRACT DOCUMENTS and in accordance with the instructions of the PROJECT-IN-CHARGE and shall be subjected

from time to time to such test at CONTRACTOR's cost as the PROJECT-IN-CHARGE may direct at the place of manufacture or fabrication or on the site or at all or any such places. The CONTRACTOR shall provide assistance, instruments, labour and materials as are normally required for examining, measuring and testing any workmanship as may be selected and required by the PROJECT-IN-CHARGE.

54.2 All the tests that will be necessary in connection with the execution of the WORK as decided by the PROJECT- IN-CHARGE shall be carried by the CONTRACTOR at any Government or in other testing laboratory as directed by PROJECT-IN-CHARGE. The charges/expenses for carrying out such tests shall be borne by the CONTRACTOR.

**55 Samples for approval:**

55.1 The CONTRACTOR shall furnish to the PROJECT-IN-CHARGE before commencement of the work, the specifications, adequate samples of all materials to be used in the WORK . The CONTRACTOR shall use such fully approved samples/materials in the actual work.

**56 Action and compensation in case of inferior works:**

56.1 If it shall appear to the PROJECT-IN-CHARGE that any work has been executed with unsound, imperfect or unskilled workmanship, or with materials of any inferior description, or that any materials or articles provided by the CONTRACTOR for the execution of the WORK are substandard, to that contracted for, or otherwise not in accordance with the CONTRACT, the CONTRACTOR shall on demand in writing from the PROJECT-IN-CHARGE or his authorised representative specifying the WORK, materials or articles complained of notwithstanding that the same may have been inadvertently passed, certified and paid for, forthwith rectify or remove and reconstruct the WORK so specified and provide other proper and suitable materials or articles at his own cost. In the event of failure to do so within the period specified by the PROJECT-IN-CHARGE in his demand aforesaid, the CONTRACTOR shall be liable to pay compensation at the rate of 1 % (One percent) of the estimated cost of the whole WORK, for every week limited to a maximum of 10% (ten percent) of the value of the whole WORK, while his failure to do so shall continue and in the case of any such failure the PROJECT-IN-CHARGE may on expiry of notice period, rectify or remove, re-execute the WORK or remove and replace with others, the materials or articles complained of to as the case may be at the risk and expense in all respects of the CONTRACTOR. The decision of the PROJECT-in-charge as to any question arising under this clause shall be final and conclusive.

**57 Suspension of works:**

57.1 Subject to the provisions of this clause, the CONTRACTOR shall, if ordered in writing by the PROJECT-IN-CHARGE, or his representative, temporarily suspend the WORKS or any part thereof for such written order, proceed with the WORK therein ordered to be suspended until, he shall have received a written order to proceed therewith. The CONTRACTOR shall not be entitled to claim compensation for any loss or damage sustained by him by reason of temporary suspension of the WORKS aforesaid. An extension of time for completion, corresponding with the delay caused by any such suspension of the WORKS as aforesaid will be granted to the CONTRACTOR should he apply for the same provided that the suspension was not consequent to any default or failure on the part of the CONTRACTOR.

**58 Right of Employer to undertake part of work:**

58.1 Upon failure of the CONTRACTOR to comply with any instructions given in accordance with the provisions of this CONTRACT the EMPLOYER has the right, instead of assuming charge of entire WORK, to place additional labour force, tools, equipments and materials on such parts of the WORK, and the EMPLOYER may designate or also engage another CONTRACTOR to carry out the WORK. In such cases, the EMPLOYER shall deduct from the amount which otherwise might become due to the CONTRACTOR, the cost of such work and material with ten percent (10%) added to cover all departmental charges and should the total amount thereof exceed the amount due to the CONTRACTOR, the CONTRACTOR shall pay the difference to the EMPLOYER.

**59 Possession prior to completion:**

59.1 The PROJECT-IN-CHARGE shall have the right to take possession of or use any completed or partially completed WORK or part of the WORK. Such possession or use shall not be deemed to be an acceptance of any work completed in accordance with the CONTRACT agreement. If such prior possession or use by the PROJECT-IN-CHARGE delays the progress of WORK, equitable adjustment in the time of completion will be made and the CONTRACT agreement shall be deemed to be modified accordingly.

**60 Defects Liability Period (Twelve months period of liability from the date of issue of completion certificate):**

60.1 The CONTRACTOR shall guarantee the installation/WORK for a period of 12 months from the date of completion of WORK as certified by the PROJECT-IN-CHARGE which is indicated in the Completion Certificate. Any damage or defect that may arise or lie undiscovered at the time of issue of Completion Certificate, connected in any way with the equipment or materials supplied by him or in the workmanship, shall be rectified or replaced by the CONTRACTOR at his own expense as deemed necessary by the PROJECT-IN-CHARGE or in default, the PROJECT-IN-CHARGE may carry out such works by other contractor and deduct actual cost incurred towards labour, supervision and materials consumables or otherwise plus 100% towards overheads (of which the certificate of PROJECT-IN-CHARGE shall be final) from any sums that may then be or at any time thereafter, become due to the CONTRACTOR or from his Contract Performance Security, or the proceeds of sale thereof or a sufficient part on thereof.

60.2 If the CONTRACTOR feels that any variation in WORK or in quality of materials or proportions would be beneficial or necessary to fulfill the guarantees called for, he shall bring this to the notice of the PROJECT-IN-CHARGE in writing. If during the period of liability any portion of the WORK /equipment, is found defective and is rectified/ replaced, the period of liability for such equipment/ portion of WORK shall be operative from the date such rectification/ replacement are carried out and Contract Performance Guarantee shall be furnished separately for the extended period of liability for that portion of WORK/ equipment only. Notwithstanding the above provisions the supplier's, guarantees/warranty for the replaced equipment shall also be passed on to the EMPLOYER.

**60.3 LIMITATION OF LIABILITY**

Notwithstanding anything contrary contained herein, the aggregate total liability of CONTRACTOR under the Agreement or otherwise shall be limited to 100% of Agreement / Contract Value. However, neither party shall be liable to the other party for any indirect and consequential damages, loss of profits or loss of production.

**61 Care of works:**

61.1 From the commencement to completion of the WORK, the CONTRACTOR shall take full responsibility for the care of all works including all temporary works and in case any damages, loss or injury shall happen to the WORK or to any part thereof or to any temporary works from any cause whatsoever, shall at his own cost repair and make good the same so that at completion, the WORK shall be in good order and in conformity in every respects with the requirement of the CONTRACT and the PROJECT-IN-CHARGE's instructions.

61.2 DEFECTS PRIOR TO TAKING OVER: If at any time, before the WORK is taken over, the PROJECT-IN-CHARGE shall: a) Decide that any works done or materials used by the CONTRACTOR or by any SUB-CONTRACTOR is defective or not in accordance with the CONTRACT, or that the works or any portion thereof are defective, or do not fulfill the requirements of CONTRACT (all such matters being hereinafter, called 'Defects' in this clause), and

b) CONTRACTOR shall be notified by the EMPLOYER in writing the above said defects alleged to exist or to have occurred, then the CONTRACTOR shall at his own expenses and with all

speed make good the defects so specified. In case CONTRACTOR shall fail to do so, the EMPLOYER may take, at the cost of the CONTRACTOR, such steps as may in all circumstances, be reasonable to make good such defects. The expenditure so incurred by the EMPLOYER will be recovered from the amount due to the CONTRACTOR. The decision of the PROJECT-IN-CHARGE with regard to the amount to be recovered from the CONTRACTOR will be final and binding on the CONTRACTOR.

61.3 DEFECTS AFTER TAKING OVER: In order to obtain COMPLETION CERTIFICATE, the CONTRACTOR shall make good, with all possible speed, any defect arising from the defective materials supplied by the CONTRACTOR or workmanship or any act or omission of the CONTRACT or that may have been noticed or developed, after the works has been taken over, the period allowed for carrying out such WORK will be normally one month. If any defect not remedied within a reasonable time, the EMPLOYER may proceed to do the WORK at CONTRACTOR's cost and all such expenses be deducted from the final bill of the CONTRACTOR by the EMPLOYER.

**62 Guarantee/transfer of guarantee:**

62.1 For works like water-proofing, acid and alkali resisting materials, pre-construction soil treatment against termite or any other specialized works etc. the CONTRACTOR shall invariably engage SUB-CONTRACTORS who are specialists in the field and firms of repute and such a SUB-CONTRACTOR shall furnish guarantees for their workmanship to the EMPLOYER, through the CONTRACTOR. In case such a SUB-CONTRACTOR/ firm is not prepared to furnish a guarantee to the EMPLOYER, the CONTRACTOR shall give that guarantee to the EMPLOYER directly.

**63 Replacement of defective parts and materials:**

63.1 If during the progress of the WORK, EMPLOYER shall decide and inform in writing to the CONTRACTOR, that the CONTRACTOR has manufactured any plant or part of the plant unsound or imperfect or has furnished plant inferior to the quality specified, the CONTRACTOR on receiving details of such defects or deficiencies shall at his own expenses within 7 (seven) days of his receiving the notice, or otherwise within such time as may be reasonably necessary for making it good, proceed to alter, re-construct or remove such work and furnish fresh equipments upto the standards of the specifications. In case the CONTRACTOR fails to do so, EMPLOYER may on giving the CONTRACTOR 7 (seven) day's notice in writing of his intentions to do so, proceed to remove the portion of the WORK so complained of and at the cost of CONTRACTOR's, perform all such works or furnish all such equipments provided that nothing in the clause shall be deemed to deprive the EMPLOYER of or affect any rights under the CONTRACT, the EMPLOYER may otherwise have in respect of such defects and deficiencies.

63.2 The CONTRACTOR's full and extreme liability under this clause shall be satisfied by the payments to the EMPLOYER of the extra cost, of such replacements procured including erection/installation as provided for in the CONTRACT; such extra cost being the ascertained difference between the price paid by the EMPLOYER for such replacements and the CONTRACT price portion for such defective plants and repayments of any sum paid by the EMPLOYER to the CONTRACTOR in respect of such defective plant. Should the EMPLOYER not so replace the defective plant the CONTRACTOR's extreme liability under this clause shall be limited to the repayment of all such sums paid by the EMPLOYER under the CONTRACT for such defective plant.

**64 Indemnity**

64.1 If any action is brought before a Court, Tribunal or any other Authority against the Employer or an officer or agent of the EMPLOYER, for the failure, omission or neglect on the part of the CONTRACTOR to perform any acts, matters, covenants or things under the CONTRACT, or damage or injury caused by the alleged omission or negligence on the part of the CONTRACTOR, his agents, representatives or his SUB- CONTRACTOR's, or in connection with any claim based on lawful demands of SUB-CONTRACTOR's workmen suppliers or employees, the CONTRACTOR, shall in such cases indemnify and keep the EMPLOYER

and/or their representatives harmless from all losses, damages, expenses or decrees arising out of such action.

**65 Construction aids, equipments, tools & tackles:**

- 65.1 CONTRACTOR shall be solely responsible for making available for executing the WORK, all requisite CONSTRUCTION EQUIPMENTS, Special Aids, Barges, Cranes and the like, all Tools, Tackles and Testing Equipment and Appliances, as required.**

**SECTION-VI CERTIFICATES AND PAYMENTS**

**66 Schedule of rates and payments:**

66.1 i) **CONTRACTOR'S REMUNERATION:** The price to be paid by the EMPLOYER to CONTRACTOR for the whole of the WORK to be done and for the performance of all the obligations undertaken by the CONTRACTOR under the CONTRACT DOCUMENTS shall be ascertained by the application of the respective Schedule of Rates and payment to be made accordingly for the WORK actually executed and approved by the PROJECT-IN-CHARGE. The sum so ascertained shall constitute the sole and inclusive remuneration of the CONTRACTOR under the CONTRACT and no further or other payment whatsoever shall be or become due or payable to the CONTRACTOR under the CONTRACT.

ii) **SCHEDULE OF RATES TO BE INCLUSIVE:** The prices/rates quoted by the CONTRACTOR shall remain firm till the issue of FINAL CERTIFICATE and shall not be subject to escalation. Schedule of Rates shall be deemed to include and cover all costs, expenses and liabilities of every description and all risks of every kind to be taken in executing, completing and handing over the WORK to the EMPLOYER by the CONTRACTOR. The CONTRACTOR shall be deemed to have known the nature, scope, magnitude and the extent of the WORK and materials required through the CONTRACT DOCUMENT may not fully and precisely furnish them.

Tenderer's shall make such provision in the Schedule of Rates as he may consider necessary to cover the cost of such items of WORK and materials as may be reasonable and necessary to complete the WORK. The opinion of the PROJECT-IN-CHARGE as to the items of WORK which are necessary and reasonable for COMPLETION OF WORK shall be final and binding on the CONTRACTOR, although the same may not be shown on or described specifically in CONTRACT DOCUMENTS.

iii) **SCHEDULE OF RATES TO COVER CONSTRUCTION EQUIPMENTS, MATERIALS, LABOUR ETC.:**

Without in any way limiting the provisions of the preceding sub-clause the Schedule of Rates shall be deemed to include and cover the cost of all construction equipment, temporary WORK (except as provided for herein), pumps, materials, labour, insurance, fuel, consumables, stores and appliances to be supplied by the CONTRACTOR and all other matters in connection with each item in the Schedule of Rates and the execution of the WORK or any portion thereof finished, complete in every respect and maintained as shown or described in the CONTRACT DOCUMENTS or as may be ordered in writing during the continuance of the CONTRACT.

iv) **SCHEDULE OF RATES TO COVER ROYALTIES, RENTS AND CLAIMS:**

**The Schedule of Rates (i.e., VALUE OF CONTRACT)** shall be deemed to include and cover the cost of all royalties and fees for the articles and processes, protected by letters, patent or otherwise incorporated in or used in connection with the WORK, also all royalties, rents and other payments in connection with obtaining materials of whatsoever kind for the WORK and shall include an indemnity to the EMPLOYER which the CONTRACTOR hereby gives against all actions, proceedings, claims, damages, costs and expenses arising from the incorporation in or use on the WORK of any such articles, processes or materials, octroi or other municipal or local Board Charges, if levied on materials, equipment or machineries to be brought to site for use on WORK shall be borne by the CONTRACTOR.



**v) SCHEDULE OF RATES TO COVER TAXES AND DUTIES:**

**No exemption or reduction of Customs Duties, Excise Duties, Sales Tax, Sales Tax on works Contract quay or any port dues, transport charges, stamp duties or Central or State Government or local Body or Municipal Taxes or duties, taxes or charges (from or of any other body), whatsoever, will be granted or obtained, all of which expenses shall be deemed to be included in and covered by the Schedule of Rates.**

**The CONTRACTOR shall also obtain and pay for all permits or other privileges necessary to complete the WORK.**

**vi) SCHEDULE OF RATES TO COVER RISKS OF DELAY:**

The Schedule of Rates shall be deemed to include and cover the risk of all possibilities of delay and interference with the CONTRACTOR's conduct of WORK which occur from any causes including orders of the EMPLOYER in the exercise of his power and on account of extension of time granted due to various reasons and for all other possible or probable causes of delay.

vii) **SCHEDULE OF RATES CANNOT BE ALTERED:** For WORK under unit rate basis, no alteration will be allowed in the Schedule of Rates by reason of works or any part of them being modified, altered, extended, diminished or committed. The Schedule of Rates are fully inclusive of rates which have been fixed by the CONTRACTOR and agreed to by the EMPLOYER and cannot be altered.

**Payment for any additional work which is not covered in the Schedule of Rates, shall only be released on issuance of change order.**

**67 Procedure for measurement and billing of work in progress:**

**67.1 BILLING PROCEDURE:**

Following procedures shall be adopted for billing of works executed by the CONTRACTOR. 67.1.1 All measurements shall be recorded in sextuplicate on standard measurement sheets supplied by EMPLOYER and submitted to EMPLOYER/CONSULTANT for scrutiny and passing.

67.1.2 EMPLOYER/CONSULTANT shall scrutinize and check the measurements recorded on the sheets and shall certify correctness of the same on the measurement sheets.

67.1.3 PROJECT-IN-CHARGE shall pass the bills after carrying out the comprehensive checks in accordance with the terms and conditions of the CONTRACTS, within 7 days of submission of the bills, complete in all respects and send the same to the Employer's Head Office located at Chennai for pre-audit and thereafter to effect payment to the CONTRACTOR.

67.1.4 **CIPET shall make all endeavour to make payments of undisputed amount of the bills submitted based on the joint measurements within 15 (Fifteen) days from the date of certification by the Project-in-Charge Architect and Corporate approval.**

67.1.5 Measurements shall be recorded as per the methods of measurement spelt out in EMPLOYER /CONSULTANT SPECIFICATIONS / CONTRACT DOCUMENT. EMPLOYER/ CONSULTANT shall be fully responsible for checking the measurements quantitatively and qualitatively as recorded in the Measurement Books/ Bills.

67.1.6 While preparing the final bill overall measurements will not be taken again. Only volume of work executed since the last measured bill alongwith summary of final measurements will be considered for the final bill. However, a detailed check shall be made as to the missing measurements if any and in case there are any and such missing items or measurements the same shall be recorded in the final bill.

**67.2 SECURED ADVANCE ON MATERIAL:**

Unless otherwise provided elsewhere in the tender, no 'Secured Advance' on security of materials brought to site for execution of contracted items(s) shall be paid to the Contractor whatsoever.

**67.3 DISPUTE IN MODE OF MEASUREMENT:**

**In case of any dispute as to the mode of measurement not covered by the CONTRACT to be adopted for any item of WORK, the latest Indian Standard Specifications shall be followed.**

**67.4 ROUNDING-OFF OF AMOUNTS:**

In calculating the amount of each item due to the CONTRACTOR in every certificate prepared for payment, sum of less than 50 paise shall be omitted and the total amount on each certificate shall be rounded off to the nearest rupees, i.e., sum of less than 50 paise shall be omitted and sums of 50 paise and more upto one rupee shall be reckoned as one rupee.

**68 Lumpsum in tender:**

68.1 The payment against any Lumpsum item shall be made only on completion of that item as per the provision of the CONTRACT after certification by PROJECT-IN-CHARGE.

**69 Running account payments to be regarded as advance:**

69.1 Each running account payment shall be regarded as –advance payment against the final bill payment and not as payments for WORK actually done/ completed. The final bill shall be submitted by the CONTRACTOR within one month of the date of physical completion of the WORK, otherwise, the PROJECT-IN-CHARGE's certificate of the measurement and of total amount payable for the WORK accordingly shall be final and binding on all parties.

**70 Notice of claims for additional payments:**

70.1 Should the CONTRACTOR consider that he is entitled to extra payment for any extra/additional WORKS or MATERIAL other than that in original SPECIFICATIONS carried out by him in respect of WORK he shall forthwith give notice in writing to the PROJECT-IN-CHARGE indicating the full details of amount claimed. that he claims extra payment. Such notice shall be given to the PROJECT-IN-CHARGE upon which CONTRACTOR bases such claims and such notice shall contain full particulars of the nature of such claim with full details of amount claimed. Irrespective of any provision in the CONTRACT to the contrary, the CONTRACTOR must intimate his intention to lodge claim on the EMPLOYER within 10 (ten) days of the commencement of happening of the event and quantify the claim within 30 (thirty) days, failing which the CONTRACTOR will lose his right to claim any compensation /reimbursement/damages etc. or refer the matter to arbitration. Failure on the part of CONTRACTOR to put forward any claim without the necessary particulars as above within the time above specified shall be an absolute waiver thereof. No omission by EMPLOYER to reject any such claim and no delay in dealing therewith shall be waiver by EMPLOYER of any of this rights in respect thereof.

70.2 PROJECT-IN-CHARGE shall review such claims within a reasonable period of time and cause to discharge these in a manner considered appropriate after due deliberations thereon. However, CONTRACTOR shall be obliged to carry on with the WORK during the period in which his claims are under consideration by the EMPLOYER, irrespective of the outcome of such claims, where additional payments for WORKS considered extra are justifiable in accordance with the CONTRACT provisions, EMPLOYER shall arrange to release the same in the same manner as for normal WORK payments. Such of the extra works so admitted by EMPLOYER shall be governed by all the terms, conditions, stipulations and specifications as are applicable for the CONTRACT. The rates for extra works shall generally be the unit rates provided for in the CONTRACT. In the event unit rates for extra works so executed are not available as per CONTRACT, payments may either be released on day work basis for which daily/hourly rates for workmen and hourly rates for equipment rental shall apply, or on the unit rate for WORK executed shall be derived by interpolation/ extrapolation of unit rates already existing in the CONTRACT. In all the matters pertaining to applicability of rate and admittance of otherwise of an extra work claim of CONTRACTOR the decision of PROJECT-IN-CHARGE shall be final and binding.

**71 Payment of contractor's bill:**

71.1 No payment shall be made for works estimated to cost less than Rs.10,000/- till the whole of the work shall have been completed and a certificate of completion given. But in case of works estimated to cost more than Rs.10,000/-, that CONTRACTOR on submitting the bill thereof be entitled to receive a payment proportionate to the part thereof approved and passed by the PROJECT-IN-CHARGE, whose certificate of such approval and passing of the sum so payable shall be final and conclusive against the CONTRACTOR.

71.2 Payment due to the CONTRACTOR shall be made by the EMPLOYER by Account Payee cheque forwarding the same to the registered office or the notified office of the CONTRACTOR. In no case will EMPLOYER be responsible if the cheque is mislaid or misappropriated by unauthorised person/persons. In all cases, the CONTRACTOR shall present his bill duly pre-receipted on proper revenue stamp and the payment shall be made in **Indian Currency**. This payment will be made after making necessary corrections/deductions as stipulated elsewhere in the CONTRACT DOCUMENT for materials, Contract Performance Security, taxes etc.

**71.3 Payment of final bill shall be made to the CONTRACTOR within 60 days from the date of submission of final bill on joint measurements, after completion of all the obligations under the CONTRACT.**

**72 Completion certificate/Virtual Completion Certificate(VCC).**

72.1 The PROJECT-IN-CHARGE shall normally issue to the CONTRACTOR the COMPLETION CERTIFICATE within one month after receiving application from the CONTRACTOR and after verifying from the completion documents and satisfying himself that the WORK has been completed in accordance with and as set out in the construction and erection drawings, and the CONTRACT DOCUMENTS. The CONTRACTOR, after obtaining the COMPLETION CERTIFICATE, is eligible to present the final bill for the WORK executed by him under the terms of CONTRACT.

72.2 Within one month of the completion of the WORK in all respects, the CONTRACTOR shall furnish with a certificate by the PROJECT-IN-CHARGE of such completion, but no certificate shall be given nor shall the WORK be deemed to have been executed until all scaffolding, **surplus materials and rubbish is cleared off the SITE completely nor until the WORK shall have been measured by the PROJECT-IN-CHARGE whose measurement shall be binding** and conclusive. The WORKS will not be considered as complete and taken over by the EMPLOYER, until all the temporary works, labour and staff colonies are cleared to the satisfaction of the PROJECT-IN-CHARGE. If the CONTRACTOR fails to comply with the requirements of this clause on or before the date fixed for the completion of the WORK, the PROJECT-IN-CHARGE may at the expense of the CONTRACTOR remove such scaffolding, surplus materials and rubbish and dispose off the same as he thinks fit and clean off such dirt as aforesaid, and the CONTRACTOR shall forthwith pay the amount of all expenses so incurred and shall have no claim in respect of any such scaffolding or surplus materials as aforesaid except for any sum actually realised by the sale thereof.

**72.3 COMPLETION CERTIFICATE DOCUMENTS:**

For the purpose of Clause 72 the following documents will be deemed to form the completion documents:

- i) The technical documents according to which the WORK was carried out.
- ii) Certificates of final levels as set out for various works.
- iii) Certificates of tests performed for various WORKS.
- iv) Material appropriation, Statement for the materials issued by the EMPLOYER for the WORK and list of surplus materials returned to the EMPLOYER's store duly supported by necessary documents.

**73 Final decision and final certificate:**

73.1 Upon expiry of the period of liability and subject to the PROJECT-IN-CHARGE being satisfied that the WORKS have been duly maintained by the CONTRACTOR during monsoon or upto the period of defect liability and that the CONTRACTOR has in all respect duly made-up any subsidence and performed all his obligations under the CONTRACT, the PROJECT-IN-CHARGE shall give a certificate herein referred to as the FINAL CERTIFICATE to that effect and the CONTRACTOR shall not be considered to have fulfilled the whole of his obligations under CONTRACT until FINAL CERTIFICATE shall have been given by the PROJECT-IN-CHARGE notwithstanding any previous entry upon the WORK and taking possession, working or using of the same or any part thereof by the EMPLOYER.

**74 Certificate and payments on evidence of completion:**

74.1 Except the FINAL CERTIFICATE, no other certificates or payments against a certificate or on general account shall be taken to be an admission by the EMPLOYER of the due performance of the CONTRACT or any part thereof or of occupancy or validity of any claim by the CONTRACTOR.

**75 Deductions from the contract price:**

75.1 All costs, damages or expenses which EMPLOYER may have paid or incurred, which under the provisions of the CONTRACT, the CONTRACTOR is liable/will be liable to pay to the EMPLOYER. All such claims shall be billed by the EMPLOYER to the CONTRACTOR regularly as and when they fall due. Such claims shall be paid by the CONTRACTOR within 15 (fifteen) days of the receipt of the corresponding bills and if not paid by the CONTRACTOR within the said period, the EMPLOYER may, then, deduct such amounts from any moneys due i.e., Contract Performance Security or becoming due to the CONTRACTOR under the CONTRACT or may be recovered by actions of law or otherwise, if the CONTRACTOR fails to satisfy the EMPLOYER of such claims.

## **SECTION-VII TAXES AND INSURANCE**

### **76 Taxes, Duties, Octroi etc:**

**76.1** The CONTRACTOR agrees to and does hereby accept full and exclusive liability for the payment of any and all Taxes, Duties, including Excise duty, octroi etc. now or hereafter imposed, increased, modified, all the sales taxes, duties, octroi etc. now in force and hereafter increased, imposed or modified, from time to time in respect of WORKS and materials and all contributions and taxes for unemployment compensation, insurance and old age pensions or annuities now or hereafter imposed by any Central or State Government authorities which are imposed with respect to or covered by the wages, salaries, or other compensations paid to the persons employed by the CONTRACTOR and the CONTRACTOR shall be responsible for the compliance of all SUB-CONTRACTORS, with all applicable **Central, State, Municipal and local law and regulation and requirement of any Central, State or local Government agency or authority.**

CONTRACTOR further agrees to defend, indemnify and hold EMPLOYER harmless from any liability or penalty which may be imposed by the Central, State or Local authorities by reason or any violation by CONTRACTOR or SUB-CONTRACTOR of such laws, suits or proceedings that may be brought against the EMPLOYER arising under, growing out of, or by reason of the work provided for by this CONTRACT, by third parties, or by Central or State Government authority or any administrative sub-division thereof.

**Tax deductions will be made as per the rules and regulations in force in accordance with acts prevailing from time to time.**

### **77 Sales tax/Turnover tax:**

**77.1** Tenderer should quote all his prices including the liability of Sales Tax/Turnover Tax whether on the works contract as a whole or in respect of bought out components used by the CONTRACTOR in execution of the CONTRACT. EMPLOYER shall not be responsible for any such liability of the CONTRACTOR in respect of this CONTRACT.

### **78 Statutory variations**

**78.1** Tenderer should quote prices inclusive of excise-duty and sales tax applicable on finished product. Any statutory variations in Excise Duty and sales tax on finished product during the contractual completion period, shall be to the Employer's account for which the Contractor will furnish documentary evidence(s) in support of their claims to EMPLOYER. However, any increase in the rate of such taxes and duties (E.D. and S.T.) beyond the contractual completion period shall be to Contractor's account and any decrease shall be passed on to the EMPLOYER.

### **79 Insurance:**

#### **i)EMPLOYEES STATE INSURANCE ACT:**

The CONTRACTOR agrees to and does hereby accept full and exclusive liability for the compliance with all obligations imposed by the Employee State Insurance Act 1948 and the CONTRACTOR further agrees to defend, indemnify and hold EMPLOYER harmless for any liability or penalty which may be imposed by the Central, State or Local authority by reason of any asserted violation by CONTRACTOR or SUB-CONTRACTOR of the Employees' State Insurance Act, 1948, and also from all claims, suits or proceeding that may be brought against the EMPLOYER arising under, growing out of or by reasons of the work provided for by this CONTRACTOR, by third parties or by Central or State Government authority or any political sub- division thereof.

The CONTRACTOR agrees to fill in with the Employee's State Insurance Corporation, the Declaration Forms, and all forms which may be required in respect of the CONTRACTOR's or SUB-CONTRACTOR's employees, who are employed in the WORK provided for or those covered by ESI from time to time under the Agreement.

#### **ii)WORKMEN COMPENSATION AND EMPLOYER'S LIABILITY INSURANCE:**

Insurance shall be effected for all the CONTRACTOR's employees engaged in the performance of this CONTRACT. If any of the work is sublet, the CONTRACTOR shall require the SUB-CONTRACTOR

to provide workman's Compensation and employer's liability insurance for the later's employees if such employees are not covered under the CONTRACTOR's Insurance.

**iii) ACCIDENT OR INJURY TO WORKMEN:**

The EMPLOYER shall not be liable for or in respect of any damages or compensation payable at law in respect or in consequence of any accident or injury to any workman or other person in the Employment of the CONTRACTOR or any SUB-CONTRACTOR save and except an accident or injury resulting from any act or default of the EMPLOYER, his agents or servants and the CONTRACTOR shall indemnify and keep indemnified the EMPLOYER against all such damages and compensation (save and except and aforesaid) and against all claims, demands, proceeding, costs, charges and expenses, whatsoever in respect or in relation thereto.

**iv) COMPREHENSIVE GENERAL LIABILITY INSURANCE**

- a) This insurance shall protect the Contractor against all claims arising from injuries, disabilities, disease or death of member of public or damage to property of others due to any act or omission on the part of the Contractor, his agents, his employees, his representatives and Sub-Contractor's or from riots, strikes and civil commotion.
- b) Contractor shall take suitable Group Personal Accident Insurance Cover for taking care of injury, damage or any other risks in respect of his Engineers and other Supervisory staff who are not covered under Employees State Insurance Act.
- c) The policy shall cover third party liability. The third party (liability shall cover the loss/ disablement of human life (person not belonging to the Contractor) and also cover the risk of damage to others materials / equipment/ properties during construction, erection and commissioning at site.

**The value of third party liability for compensation for loss of human life or partial/full disablement shall be of required statutory value but not less than Rs. 2 lakhs per death, Rs. 1.5 lakhs per full disablement and Rs. 1 lakh per partial disablement and shall nevertheless cover such compensation as may be awarded by Court by Law in India and cover for damage to others equipment/ property as approved by the Purchaser. However, third party risk shall be maximum to Rs. 10(ten) lakhs to death.**

## **SECTION-VIII : LABOUR LAWS**

### **80 Labour laws:**

80.1 i) No labour below the age of 18 (eighteen) years shall be employed on the WORK.

ii) The CONTRACTOR shall not pay less than what is provided under law to labourers engaged by him on the WORK.

iii) The CONTRACTOR shall at his expense comply with all labour laws and keep the EMPLOYER indemnified in respect thereof.

iv) The CONTRACTOR shall pay equal wages for men and women in accordance with applicable labour laws.

v) If the CONTRACTOR is covered under the Contract labour (Regulation and Abolition) Act, he shall obtain a license from licensing authority (i.e. office of the labour commissioner) by payment of necessary prescribed fee and the deposit, if any, before starting the WORK under the CONTRACT. Such fee/deposit shall be borne by the CONTRACTOR.

vi) The CONTRACTOR shall employ labour in sufficient numbers either directly or through SUB-CONTRACTOR's to maintain the required rate of progress and of quality to ensure workmanship of the degree specified in the CONTRACT and to the satisfaction of the PROJECT-IN-CHARGE.

vii) The CONTRACTOR shall comply with the provisions of **the payment of Wage Act 1936, Employee Provident Fund Act 1952, Minimum Wages Act 1948. Employers Liability Act 1938. Workmen's Compensation Act 1923, Industrial Disputes Act 1947, the Maternity Benefit Act 1961 and Contract Labour Regulation and Abolition Act 1970, Employment of Children Act 1938 from time to time or any modifications thereof or any other law relating thereto and rules made there under time.**

### **81 Contractor to indemnify the Employer:**

81.1 i) The CONTRACTOR shall indemnify the EMPLOYER and every member, office and employee of the EMPLOYER, also the PROJECT-IN-CHARGE and his staff against all actions, proceedings, claims, demands, costs and expenses whatsoever arising out of or in connection with the matters of **damage to the property or to any person or any third party** and all actions, proceedings, claims, demands, costs and expenses which may be made against the EMPLOYER for or in respect of or arising out of any failure by the CONTRACTOR in the performance of his obligations under the CONTRACT DOCUMENT. The EMPLOYER shall not be liable for or in respect of or arising out of any failure by the CONTRACTOR in the performance of his obligations under the CONTRACT DOCUMENT. The EMPLOYER shall not be liable for or in respect of any demand or compensation payable by law in respect or in consequence of any accident or injury to any workmen or other person. In the employment of the CONTRACTOR or his SUB-CONTRACTOR the CONTRACTOR shall indemnify and keep indemnified the EMPLOYER against all such damages and compensations and against all claims, damages, proceedings, costs, charges and expenses whatsoever in respect thereof or in relation thereto.

### **ii) PAYMENT OF CLAIMS AND DAMAGES:**

Should the EMPLOYER have to pay any money in respect of such claims or demands as aforesaid the amount so paid and the costs incurred by the EMPLOYER shall be charged to and paid by the CONTRACTOR and the CONTRACTOR shall not be at liberty to dispute or question the right of the EMPLOYER to make such payments notwithstanding the same, may have been made without the consent or authority or in law or otherwise to the contrary.

iii) In every case in which by virtue of the provisions of **Section 12, Sub-section (i) of workmen's compensation Act, 1923** or other applicable provision of Workmen Compensation Act or any other Act, the EMPLOYER is obliged to pay compensation to a workman employed by the CONTRACTOR in execution of the WORK, the EMPLOYER will recover from the CONTRACTOR the amount of the compensation so paid, and without prejudice to the rights of EMPLOYER under Section 12, Sub-section (2) of the said act, EMPLOYER shall be at liberty to recover such amount or any part thereof by deducting it from the Contract Performance Security or from any sum due to the CONTRACTOR whether under this CONTRACT or otherwise. The EMPLOYER shall not be bound to contest any claim made under Section 12,

Sub-section (i) of the said act, except on the written request of the CONTRACTOR and upon his giving to the EMPLOYER full security for all costs for which the EMPLOYER might become liable in consequence of contesting such claim.

**82 Health and sanitary arrangements for workers:**

82.1 In respect of all labour directly or indirectly employed in the WORKS for the performance of the CONTRACTOR's part of this agreement, the CONTRACTOR shall comply with or cause to be complied with all the rules and regulations of the local sanitary and other authorities or as framed by the EMPLOYER from time to time for the protection of health and sanitary arrangements for all workers.

82.2 The CONTRACTOR shall provide in the labour colony all amenities such as electricity, water and other sanitary and health arrangements. The CONTRACTOR shall also provide necessary surface transportation to the place of work and back to the colony for their personnel accommodated in the labour colony.



## **SECTION-IX APPLICABLE LAWS AND SETTLEMENT OF DISPUTES**

### **83 Arbitration:**

83.1 Unless otherwise specified, the matters where decision of the Project-in-Charge is deemed to be final and binding as provided in the Agreement and the issues/disputes which cannot be mutually resolved within a reasonable time, all disputes shall be referred to arbitration by Sole Arbitrator.

The Employer shall suggest a panel of three independent and distinguished persons to the bidder/contractor/supplier/buyer (as the case may be) to select any one among them to act as the Sole Arbitrator.

In the event of failure of the other parties to select the Sole **Arbitrator within 30 days from the receipt of the communication** suggesting the panel of arbitrators, the right of selection of the sole arbitrator by the other party shall stand forfeited and the EMPLOYER (CIPET) shall have discretion to proceed with the appointment of the Sole Arbitrator. The decision of Employer on the appointment of the sole arbitrator shall be final and binding on the parties.

The award of sole arbitrator shall be final and binding on the parties and unless directed/awarded otherwise by the sole arbitrator, the cost of arbitration proceedings shall be shared equally by the parties. The Arbitration proceedings shall be in English language and venue shall be Lucknow, India. Subject to the above, the provisions of (Indian) Arbitration & Conciliation ACT 1996 and the Rules framed there under shall be applicable. All matter relating to this contract are subject to the exclusive jurisdiction of the court situated in the state of Uttar Pradesh.

Bidders/suppliers/contractors may please note that the **Arbitration & Conciliation Act 1996** was enacted by the Indian Parliament and is based on United Nations Commission on International Trade Law (UNCITRAL model law), which were prepared after extensive consultation with Arbitral Institutions and centers of International Commercial Arbitration. The United Nations General Assembly vide resolution 31/98 adopted the UNCITRAL Arbitration rules on 15 December 1976.

83.2 **FOR THE SETTLEMENT OF DISPUTES BETWEEN GOVERNMENT DEPARTMENT AND ANOTHER AND ONE GOVERNMENT DEPARTMENT AND PUBLIC ENTERPRISE AND ONE PUBLIC ENTERPRISE AND ANOTHER THE ARBITRATION SHALL BE AS FOLLOWS:**

"In the event of any dispute or difference between the parties hereto, such dispute or difference shall be resolved amicably by mutual consultation or through the good offices of empowered agencies of the Government.

If such resolution is not possible, then, the unresolved dispute or difference shall be referred to arbitration of an arbitrator to be nominated **by Secretary, Department of Legal Affairs ("Law Secretary") in terms of the Office Memorandum No.55/3/1/75-CF, dated the 19th December 1975 issued by the Cabinet Secretariat (Department of Cabinet Affairs)**, as modified from time to time. The Arbitration Act 1940 (10 of 1940) shall not be applicable to the arbitration under this clause. The award of the Arbitrator shall be binding upon parties to the dispute. Provided, however, any party aggrieved by such award may make a further reference for setting aside or revision of the award to Law Secretary whose decision shall bind the parties finally and conclusively.

### **84 Jurisdiction:**

84.1 The CONTRACT shall be governed by and constructed according to the laws in force in INDIA. The CONTRACTOR hereby submits to the jurisdiction of the Courts situated at

LUCKNOW for the purposes of disputes, actions and proceedings arising out of the CONTRACT, the courts at LUCKNOW only will have the jurisdiction to hear and decide such disputes, actions and proceedings.

**SECTION-X SAFETY CODES:**

**85 Safety regulations:**

85.1 i) In respect of all labour, directly employed in the WORK for the performance of CONTRACTOR's part of this agreement, the CONTRACTOR shall at his own expense arrange for all the safety provisions as per safety codes of C.P.W.D., Indian Standards Institution. The Electricity Act, The Mines Act and such other acts as applicable.

ii) The CONTRACTOR shall observe and abide by all fire and safety regulations of the EMPLOYER. Before starting construction work CONTRACTOR shall consult with PROJECT-IN-CHARGE and must make good to the satisfaction of the EMPLOYER any loss or damage due to fire to any portion of the work done or to be done under this agreement or to any of the EMPLOYER's existing property.

**86 First aid and industrial injuries:**

86.1 i) CONTRACTOR shall maintain first aid facilities for its employees and those of its SUB-CONTRACTOR.

ii) CONTRACTOR shall make outside arrangements for ambulance service and for the treatment of industrial injuries. Names of those providing these services and their telephone numbers shall be prominently posted in CONTRACTOR's field office.

ii) All critical industrial injuries shall be reported promptly to EMPLOYER, and a copy of CONTRACTOR's report covering each personal injury requiring the attention of a physician shall be furnished to the EMPLOYER.

**The CONTRACTOR shall abide by the safety code provision as per C.P.W.D. Safety code and Indian Standard Safety Code from time to time.**

VOLUME II OF V

TECHNICAL SPECIFICATIONS

FOR

CIVIL WORKS

**GENERAL INFORMATION**

**A. GENERAL:**

The work under this tender shall be executed strictly in accordance with constructional and material requirements defined under these specifications. The Contractor shall carefully acquaint himself with these specifications to determine his contractual obligations for the work. The conditions of these specifications will be binding on the Contractor and no deviation shall be permissible unless specifically approved by the Consultant / Project-in-charge in writing. In absence of any detailed Specifications these specification, latest Indian Standard specifications and code of practice shall become applicable. Wherever the codes and specifications are silent then the same shall be governed by sound engineering practices and the decision of the Project-in-charge / consultant in matters of interpretation etc., shall be final and binding on the Contractor.

**B. DRAWINGS / DIMENSIONS:**

Figured dimensions on drawings shall supersede measurements by scale and drawings to a large scale take precedence over those to a smaller scale. Special dimensions or directions in the specifications shall be checked on site. Measurements and other information concerning the existing site on the drawings are believed to be correct, but the Contractor shall verify them for himself and also examine the nature of the ground as no claim or allowance whatsoever shall be entertained hereinafter on account of any errors or omissions in the levels or the description of the ground turning out to be different from what was expected or shown on the drawings.

**C. CORRELATION OF DRAWING:**

Before commencement of work, the Contractor shall correlate all relevant structural, Construction and services drawings and satisfy himself that the information available is complete and unambiguous. The Contractor shall be responsible for any error / difficulty in execution / damage incurred owing to any discrepancy in the drawings which has been overlooked by him and has not been brought to the notice of the Project-in-charge / Consultant before execution.

**D. B.I.S CODES OF PRACTICE:**

Wherever any reference is made in the specifications to **any bureau of Indian Standard (IS)** code of practice, it shall be understood to indicate the latest version of the code of practice in usage at the time of construction.

**E. ALL SIMILAR RATES TO HAVE SAME QUOTED RATE**

It shall be noted by the bidder that a similar item repeated at various sub heads of the tender, he should quote same rates. For any reasons different rates are quoted the lowest rate shall be considered for deriving the substituted / extra item rate if required.

## SPECIFICATIONS

### 1. **DISMANTLING AND DEMOLISHING**

#### 1.0 TERMINOLOGY

**Dismantling:** The term 'Dismantling' implies carefully separating the parts without damage and removing. This may consist of dismantling one or more parts of the building as specified or shown on the drawings.

**Demolition :** The term 'Demolition' implies breaking up. This shall consist of demolishing whole or part of work including all relevant items as specified or shown on the drawings.

#### 1.1 GENERAL

This chapter relates to buildings only.

##### 1.1.1 Precautions

**1.1.1.1** All materials obtained from dismantling or demolition shall be the property of the Government unless otherwise specified and shall be kept in safe custody until they are handed over to the Engineer-in-Charge/ authorized representative.

**1.1.1.2** The demolition shall always be well planned before hand and shall generally be done in reverse order of the one in which the structure was constructed. The operations shall be got approved from the Engineer-in-Charge before starting the work.

Due care shall be taken to maintain the safety measures prescribed in IS 4130.

**1.1.1.3** Necessary propping, shoring and or under pinning shall be provided to ensure the safety of the adjoining work or property before dismantling and demolishing is taken up and the work shall be carried out in such a way that no damage is caused to the adjoining work or property. Wherever specified, temporary enclosures or partitions and necessary scaffolding with suitable double scaffolding and proper cloth covering shall also be provided, as directed by the Engineer-in-Charge.

**1.1.1.4** Necessary precautions shall be taken to keep noise and dust nuisance to the minimum. All work needs to be done under the direction of Engineer -in-Charge. Helmets, goggle, safety belts etc. should be used whenever required and as directed by the Engineer-in-Charge.

The demolition work shall be proceeded with in such a way that it causes the least damage and nuisance to the adjoining building and the public.

**1.1.1.5** Dismantling shall be done in a systematic manner. All materials which are likely to be damaged by dropping from a height or by demolishing roofs, masonry etc. shall be carefully removed first. Chisels and cutters may be used carefully as directed. The dismantled articles shall be removed manually or otherwise, lowered to the ground (and not thrown) and then properly stacked as directed by the Engineer-in-Charge.

**1.1.1.6** Where existing fixing is done by nails, screws, bolts, rivets, etc., dismantling shall be done by taking out the fixing with proper tools and not by tearing or ripping off.

**1.1.1.7** Any serviceable material, obtained during dismantling or demolition, shall be separated out and stacked properly as directed by the Engineer-in-Charge within a lead of 50 metres. All unserviceable materials, rubbish etc. shall be disposed off as directed by the Engineer-in-Charge.

**1.1.1.8** The contractor shall maintain/disconnect existing services, whether temporary or permanent, where required by the Engineer-in-Charge.

**1.1.1.9** No demolition work should be carried out at night especially when the building or structure to be demolished is in an inhabited area.

**1.1.1.10** Screens shall be placed where necessary to prevent injuries due to falling pieces.

**1.1.1.11** Water may be used to reduce dust while tearing down plaster from brick work.

**1.1.1.12** Safety belts shall be used by labourers while working at higher level to prevent falling from the structure.

**1.1.1.13** First-aid equipment shall be got available at all demolition works of any magnitude.

## **1.2 RECOMMENDATIONS FOR DEMOLITION OF CERTAIN SPECIAL TYPES AND ELEMENTS OF STRUCTURES**

### **1.2.1 Roof Trusses**

If a building has a pitched roof, the roof structure should be removed to wall plate level by hand method. Sufficient purlins and bracing should be retained to ensure stability of the remaining roof trusses while each individual truss is removed progressively.

**1.2.1.1** Temporary bracing should be added, where necessary, to maintain stability. The end frame opposite to the end where dismantling is commenced, or a convenient intermediate frame should be independently and securely guyed in both directions before work starts.

**1.2.1.2** On no account should the bottom tie of roof trusses be cut until the principal rafters are prevented from making outward movement.

### **1.2.3 Heavy Floor Beams**

Heavy bulks of timber and steel beams should be supported before cutting at the extremities and should then be lowered to a safe working place.

### **1.2.4 Jack Arches**

Where tie rods are present between main supporting beams, these should not be cut until after the arch or series of arches in the floor have been removed. Particular care should be exercised and full examination of this type of structure undertaken before demolition is commenced (see Fig. 15.1). The floor should be demolished in strips parallel to the span of the arch. rings (at right angles to the main floor beams).

### **1.2.5 Brick Arches**

**1.2.5.1** Expert advice should be obtained and at all stages of the demolition, the closest supervision should be given by persons fully experienced and conversant in the type of work to ensure that the structure is stable at all times.

**1.2.5.2** As much dead load as possible may be removed provided it does not interfere with the stability of the main arch rings but it should be noted that the load-carrying capacity of many old arches relies on the filling between the spandrels. On no account should the restraining influence of the abutments be removed before the dead load of the spandrel fill and the arch rings are removed.

**1.2.5.3** The normal sequence of demolition is as shown in Fig. 15.2-A, namely:  
Remove spandrel in filling down to the springing line,  
Remove the arch. rings and  
Remove the abutment.

**1.2.5.4** Special temporary support shall be provided in the case of skew bridges.

**1.2.5.5** A single span arch. can be demolished by hand by cutting narrow segments progressively from each springing parallel to the span of the arch until the width of the arch has been reduced to a minimum which can then be collapsed (see Fig. 15.2B).

**1.2.5.6** Where it is impossible to allow debris to fall to the ground below, centering designed to carry the load should be erected and the arch demolished progressively. The design of the centering should make appropriate allowance for impact.

**1.2.5.7** Where deliberate collapse is feasible the crown may be broken by the demolition ball method working progressively from edges to the centre (see Fig. 15.2C).

**1.2.5.8** Collapse of the structure can be effected in one action by the use of explosives. Charges should be inserted into boreholes drilled in both arch and abutments. This method is the most effective for demolition of tall viaducts.

**1.2.5.9** In multi-span arches before individual spans are removed, lateral restraint should be provided at the springing level. Demolition may then proceed as for a single span, care being taken to demolish the spandrels down to the springing line as the work proceeds (see Fig. 15.2D). Where explosives are used it is preferable to ensure the collapse of the whole structure in one operation to obviate the chance of leaving unstable portions standing.

#### **1.2.6 Cantilevers (Not part of a Framed Structure)**

A cantilever type of construction depends for its stability on the super imposed structure. Canopies, cornices, staircases and balconies should be demolished or supported before the tailing down load is removed.

#### **1.2.7 In-situ Reinforced Concrete**

**1.2.7.1** Before commencing demolition, the nature and condition of the concrete, the condition and position of reinforcement, and the possibility of lack of continuity of reinforcement should be ascertained.

**1.2.7.2** Attention should be paid to the principles of the structural design to determine which parts of the structure depend on each other to maintain overall stability.

**1.2.7.3** Demolition should be commenced by removing partitions and external non-load bearing cladding. It should be noted that in some buildings the frame may rely on the panel walls for stability.

**1.2.7.4** Where hard demolition methods are to be used, the following procedures should be used.

##### ***Reinforced Concrete Beams***

For beams, a supporting rope should be attached to the beam. Then the concrete should be removed from both ends by pneumatic drill and the reinforcement exposed. The reinforcement should then be cut in such a way as to allow the beam to be lowered under control to the floor (see Fig. 15.3A).

##### ***Reinforced Concrete Columns***

For columns, the reinforcement should be exposed at the base after restraining wire guy ropes have been placed round the member at the top. The reinforcement should then be cut in such a way as to allow the column to be pulled down to the floor under control. (see Fig. 15.3B for sequence of operations).

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##### ***Reinforced Concrete Walls***

Reinforced concrete walls should be cut into strips and demolished as for columns (Fig. 15.3C).

### **1.3 MEASUREMENTS**

**1.3.1** All work shall be measured net in the decimal system, as fixed in its place, subject to the following limits, unless otherwise stated hereinafter.

Dimensions shall be measured correct to a cm.

Areas shall be worked out in sqm correct to two places of decimal.

Cubical contents shall be worked out to the nearest 0.01 cum.

**1.3.2** Parts of work required to be dismantled and those required to be demolished shall be measured separately.

**1.3.3** Measurements of all work except hidden work shall be taken before demolition or dismantling and no allowance for increase in bulk shall be allowed.

**1.3.4** Specifications for deduction for voids, openings etc. shall be on the same basis as that adopted for new construction of the work.

**1.3.5** Work executed in the following conditions shall be measured separately.

Work in or under water and/or liquid mud

Work in or under foul position.

**1.3.6 Roofs**

Roof coverings generally including battens boarding, mats, bamboo jaffari or other subsidiary supports shall be measured in square metres except lead sheet roof covering which shall be measured in quintals (15.2.3) and stone slab roof covering which shall be measured in cubic metres.

Ridges, hips and valleys shall be girthed and included with the roof area. Corrugated or semi corrugated surfaces shall be measured flat and not girthed.

Mud phuska on roofs shall be measured in cubic metres.

Lead sheets in roofs shall be measured in quintals and hips, valleys, flashings, lining to gutter etc. shall be included in this weight.

R.B. or R.C.C. roofs shall be measured as specified in 15.3.11.

Supporting members, such as rafters, purlins, beams joists, trusses etc. of wood shall be measured in cubic metres and steel or iron sections, in quintals.

**1.3.7 Ceiling**

The stripping of ceilings shall be measured in square metres.

Dismantling of supporting joists, beams, etc. shall be measured in cubic metres or in quintals as specified in 15.3.6(vi).

Height above floor level, if it exceeds 3.5 m shall be paid for separately.

**1.3.8 Flooring and Pavings**

Dismantling of floors (except concrete and brick floors) shall be measured in square metres. Supports such as joints, beams etc. if any shall be measured as per 15.3.6(vi). Concrete and bricks paving shall be measured as per 15.3.9.

**1.3.9 Concrete and Brick Roofs and Suspended Floors**

Demolition of floors and roofs of concrete or brick shall be measured in cubic metres. Beams cantilevers or other subsidiary supports of similar materials, shall be included in the item. In measuring thickness of roofs provide with water proofing treatments with bitumen felts, the thickness of water proofing treatment shall be ignored.

**1.3.10 Walls and Piers**

Taking down walls and independent piers or columns of brick, stone or concrete shall be measured, in cubic metres. All copings, corbels, cornices and other projections shall be included with the wall measurements.

In measuring thickness of plastered walls, the thickness of plaster shall be ignored.

Ashlar face stones, dressed stone work, pre-cast concrete articles, etc. if required to be taken down intact shall be so stated and measured separately in cubic metres.

Cleaning stone obtained from demolished/dismantling stone masonry of any description including ashlar facing dressed stone work, stone slabs or flagging and pre-cast concrete blocks including all extra handling and disposing off the rubbish as stated shall be measured in cubic metres of cleaned stone.

Honey comb works or cavity walls of bricks stone or concrete shall be measured as solid.

**1.3.11 Reinforced Concrete and Brick Work**

Reinforced concrete structures and reinforced brick roofs and walls shall be measured in cubic metres and if reinforcement is required to be salvaged, it shall be so stated.

Where reinforcement is required to be separated, scraped and cleaned, the work shall be measured separately in quintal of salvaged steel.

**1.3.12 Partitions, Trellis Work etc.**



Partitions or light walls, of lath and plaster, trellis work, expanded metal, thin concrete or terracota slabs and other similar materials including frame work if any shall be measured in square metres stating the over all thickness.

#### **1.3.13 Wood Work**

All wood work including karries average 40 sq cm or over in section, shall be measured in cubic metres, while that under 40 sq cm in section, in running metres. Ballies shall be measured in running metres.

Boarding including wooden chajjas and sun shades along with supports shall be measured in square metres in its plane.

#### **1.3.14 Steel and Iron Work**

All steel and iron work shall be measured in quintals. The weight shall be computed from standard tables unless the actual weight can readily be determined.

Riveted work, where rivets are required to be cut, shall be measured separately.  
Marking of structural steel required to be re-erected shall be measured separately.

In framed steel items, the weight or any covering material or filling such as iron sheets and expanded metal shall be included in the weight of the main article unless such covering is not ordered to be taken out separately.

#### **1.3.15 Doors and Windows**

Dismantling of doors, windows, clerestory windows, ventilators etc. (wood or metal) whether done separately or along with removal of wall by making recess in the wall shall be enumerated. Those exceeding 3 sqm each in area shall be measured separately. The item shall include removal of chowkhats architraves, holdfasts and other attachments.

If only shutters are to be taken out it shall be measured separately.

### **1.4 RATES**

The rate shall include the cost of all labour involved and tools used in demolishing and dismantling including scaffolding. The rate shall also include the charges for separating out and stacking the serviceable material properly and disposing off unserviceable material within a distance of 50 metres.

The rate shall also include for temporary shoring for the safety of portions not required to be pulled down, or of adjoining property, and providing temporary enclosures or partitions, where considered necessary.

## **2. SPECIFICATION OF ANTI-TERMITE TREATMENT - N.A**

### **3. SPECIFICATION FOR CAST – IN – SITU REINFORCED CEMENT CONCRETE**

#### **3.1 GENERAL**

##### **3.1.1 DESCRIPTION**

This section covers the requirements for finishing of cement concrete, proportioning, batching, mixing, testing, placing, compacting, finishing, jointing, curing and all other work as required for cast in place reinforced concrete. The contractor shall provide all the materials including cement, steel, labour, equipment, 'form work', scaffolding etc., required for completion of all reinforced concrete works as per drawings and documents. Cement concrete shall be composed of cement, fine aggregate, coarse aggregate, water, with or without admixture as approved, proportioned and mixed as specified herein.

##### **3.1.2 RELATED WORK SPECIFIED ELSEWHERE**

- a) Steel reinforcement
- b) Form work

### **3.1.3 APPLICABLE CODES AND STANDARDS**

The codes and standards generally applicable to the work of this section are listed hereinafter.

- IS 383 Coarse and fine aggregates from natural sources for concrete
- IS 456 Code of practice for plain and reinforced concrete
- IS 516 Methods of testing for strength of concrete
- IS 1199 Methods of sampling and analysis of concrete
- IS 1838 Performed fillers for expansion joints in concrete non-extruding and resilient type
- IS 1946 Code of practice for use of fixing devices in walls, ceiling and floors of solid Construction
- IS 2389 Methods of testing of aggregate for concrete's
- IS 2505 Concrete vibrators, immersion type
- IS 2645 Integral cement water proofing compounds
- IS 3414 Code of practice for design and installation of joints in buildings
- IS 3558 Code of practice for use for immersion vibrators for consolidating concrete

IS 4082 Recommendation on stacking and storage of construction materials at  
IS 7861 Code of practice for extreme weather concretizing  
IS 7861 Recommended practice for hot weather (part I) concretizing  
IS 8112 Ordinary Portland Cement grade 43  
IS 12269 Ordinary Portland Cement grade 53

**PART— I**

The following clauses are intended to amplify the requirements of the reference document listed above and the contractor shall comply with these clauses

**3.2 SUBMITTALS**

**3.2.1 Material Report**

**3.2.2** Prior to start of delivery of materials required, the following shall be submitted by the contractor to the Consultant / Project-in-charge for approval

Suppliers and / or sources of all consumable materials including cement, steel, fine and coarse aggregates, water additives, bricks and timber etc.

Quality Inspection Plan to ensure continuing quality control of ingredients by periodic sampling, testing and reporting to the Consultant on the quality of materials being supplied.

**3.3 PLANT AND EQUIPMENT**

The contractor shall submit the following to the Consultant well in advance.

The proposed program, methods and details of plant and Equipment for be used to testing of ingredients and concrete samples.

The proposed programme methods and details of plant & equipment to be used for concrete work.

**3.4 REPORTS FOR INSPECTION AND TESTING**

During concreting operations, the contractor shall conduct inspection and testing as described under the list of mandatory tests in this volume and all reports thereon shall be submitted in summary form to the Consultant / Project-in-charge.

**3.5 SCHEDULES**

Before commencement of the work the contractor shall prepare working schedules of concreting giving dates and rate of pour for each item of work and submit the same to the Consultant / Project-in-charge for their approval.

**3.6 MATERIALS**

Before bringing to the site, all materials for cement concrete shall be approved by the Consultant / Project-in-charge. All approved samples shall be deposited in the office of the Consultant / Engineer-incharge before placing orders for the materials with suppliers The materials brought on to the work shall conform in every respect to their approved samples.

Fresh samples shall be deposited with the Consultant / Project-in-charge whenever type or source of any material changes The contractor shall check each fresh consignment of materials as it is brought on to the works to ensure that they conform to the specification and / or approved samples.

The Consultant / Project-in-charge shall have the option to have any of the materials tested to find whether they are in accordance with specifications at the contractor \_s expense. All bills vouchers and test certificates which in the opinion of the Consultant / Project-in-charge are necessary to convince him as to the quality of materials or their suitability shall be produced for his inspection when required.

Any materials which have not been found to the specification and not approved by the Consultant / Project-in-charge shall be rejected forthwith and shall be removed from the site by the Contractor's at his own cost within the time stipulated by the Consultant / Project-in-charge. The Consultant / Project-in-charge shall have the powers to cause the contractors to purchase and use materials from any particular source, as may in their opinion be necessary for the proper execution of work.

### 3.6.1 CEMENT

Cement shall be provided by the Contractor. On the following types of cement as specified shall be used

- a. Ordinary Portland Cement 43 grade confirming to BIS 8112-1987**  
**b. Ordinary Portland Cement 53 grade confirming to BIS 12269-1987**

Cement at site shall be stored in dry weather proof go-downs (or shed) built by the Contractor at his own costs in stacks which are not higher than 10 bags. The cement go-down shall be constructed as per CPWD specifications. The contractor shall conduct all necessary tests as specified in the IS, at his own cost to ascertain himself on quality of the material.

### 3.6.2 AGGREGATES

a) Aggregates from natural sources shall be in accordance with IS:383. The contractor shall submit to the Consultant / Project-in-charge certificates of grading and compliance from the suppliers for all consignments of aggregate. In addition at site from time to time, the contractor shall test the aggregates in accordance with IS: 2386 parts I, II, III and IV. The contractor shall allow for and provide all necessary apparatus for carrying out each test and for supplying test records to the Consultant.

b) For fair faced concrete, the contractor shall ensure that aggregates are free from iron pyrites and impurities which may cause discoloration.

c) The fine aggregates shall be river sand, stone dust or other approved sand. It shall be free from clay, loam, earth or vegetables matter and from salt or other harmful chemical impurities. It shall be clean sharp, strong angular and composed of hard siliceous material.

The grading of sand as determined by the method prescribed in IS: 2386 part I shall be within the limits of grading zone III given in Table 1. When the grading falls outside the percentage limits given for sieves other than 600 micron, 300 micron, and 150 micron (I.S) sieves by not more than 5 percent, it shall be regarded as falling within this zone. The 5 percent can be excess submission on one more sieves.

**TABLE 1**

#### FINE AGGREGATE

I. S. Sieve Percentage passing for Grading

IV	ZONEI	ZONEII	ZONEIII	ZONE
10 mm	100	100	100	100
4.75 mm	90-95	90-100	90-100	95-100
2.36 mm	60-95	75-100	85-100	95-100
1.18mm	30-70	55-90	75-100	90-100
600 micron	15-34	35-59	35-60	80-100
300 micron	5-20	8-30	8-30	20-65
150 micron	0-10	0-10	0-10	0-15

The maximum quantity of silt as determined by the method prescribed in IS: 2386 Part II shall not exceed 8%.

Stone dust shall be within the limits of Grading Zone III given in table 1. When the grading falls outside the percentage limits given for the sieves other than 600 micron and 300 micron (IS) sieves by not more than 5 percent and on 150 micron sieves by not more than 20 percent it shall

be regarded as falling within this zone. The 5 percent can be excess summation on one or more sieves.

### **COARSE AGGREGATE**

The coarse aggregate shall be crushed stone or broken stone. Coarse aggregate obtained from crushed or broken stone shall be angular, hard, strong, dense, durable clean and free from soft, friable, thin, flat, elongated flaky pieces. The coarse aggregate should be from the approved source/quarry. Coarse aggregate River shingle or pit gravel shall be rounded, sound hard, clean, non porous, suitably graded in size with or without broken fragments and free from flat particle of shale, clay, silt, loam and other impurities.

Except where it can be shown to the satisfaction of the Consultant that a supply of properly graded aggregate of uniform quality can be maintained over the period of the obtaining the coarse aggregate in different sizes & blending them in correct proportions as and when required.

The maximum size of coarse aggregate shall be such that the concrete can be placed without difficulty so as to surround all reinforcement thoroughly and fill the corners of form work.

### **3.6.3 WATER**

Water used in the works shall be potable water and free from deleterious materials. Water used for mixing and curing concrete as well as for cooling and/or washing aggregate shall be fresh and clean, free from injurious amounts of oil, salts, acids, alkali, other chemicals and organic matter.

Water shall be from the source approved by the Consultant / Project-in-charge and shall be in accordance with Clause 4.3 of IS: 456.

Before starting any concreting work and whenever the source of water changes, the water shall be tested for its chemical and other impurities to ascertain its suitability for use in concrete for approval of the Consultant. No water shall be used until tested and found satisfactory. Cost of all such tests shall be borne by the contractor.

### **3.6.4 ADMIXTURES AND ADDITIVES**

Chemical admixtures are not to be used until permitted by the Consultant/Project-in-charge in case their use is permitted, the type, amount and method of use of any admixture proposed by the contractor shall be submitted to the Consultant for approval

The contractor shall further provide the following information concerning each admixture to the Consultant/Project-in-charge.

- a) Normal dosage and detrimental effects, if any, of under dosage and over dosage.
- b) The chemical names of the main ingredients in the admixture.
- c) The chloride ion content, if any, expressed as a percentage by weight of admixture.
- d) Whether or not the admixture leads to the entrainment of air when used in the manufacturer's recommended dosage.
- e) Where two or more admixtures are proposed to be used in any one mix, the manufacturer's written confirmation of their compatibility.

In reinforced concrete, the chloride ion of any admixture as determined in accordance with IS: 6925 and the total chloride ion in all admixtures used in concrete mix shall not exceed 0.30 percent by weight of cement. The admixtures when used shall conform to IS: 9103. The suitability of all admixtures shall be verified by trial mixes.

The addition of calcium chloride to concrete containing embedded metal will not be permitted under any circumstances.

Regarding admixtures when used shall be based on ligno-sulphonates with due consideration to clause 5.2 and 5.30 of IS: 7861.

Waterproofing admixtures shall comply with IS: 2645.

### **3.7 PLANT**

The contractor shall obtain the approval of the Consultant/Project-in-charge for all plant items he proposes to use for the manufacture and placing of concrete.

The arrangement shall maintain all items of plant at all times in a clean and efficient working condition.

### **3.8 STORAGE**

All goods and products covered by these specifications shall be procured well in advance and stored as specified below.

#### **3.8.1 CEMENT**

Cement shall be stored on a raised floor in dry weather **proof & dust free but** well ventilated shed.

Cement bags shall be stacked close together away from external walls and in stacks of not more than ten bags to avoid lumping under pressure.

Cement stored during monsoons or cement expected to be in store for more than eight weeks shall be completely enclosed in 700 micron polyethylene sheet so arranged that the flap closes on the top stack. The contractor shall ensure that protective polyethylene sheet is not damaged at any time during use.

Consignments of cement shall be used in order of delivery. A record shall be kept of the batch numbers of cement deliveries in such a form that the part of the works in which the cement is used can be readily identified. If during delivery or by test, the cement is found to be defective, the same shall be returned back forthwith.

The contractor shall be responsible for the storage of cement at the site and no claim will be entertained in the event of any damage occurring to cement due to faulty storage by the contractors or on account of his negligence.

Cement stored on site for a period longer than eight weeks shall be tested to the satisfaction of the Consultant/Project-in-charge before it is used in the works. Cement that has failed the tests conducted shall not be used in the works and shall be removed from the site immediately without fail.

#### **3.8.2 STORING OF AGGREGATE**

Aggregates shall be stored on a suitable well drained raft of concrete, timber, metal or other approved material. The storage of aggregates on the ground will not be permitted.

Each size of aggregate shall be stored separately in such a manner as to prevent spillage and mixing of one aggregate with an adjacent aggregate. The dividing walls of any bin shall be of sufficient height and the aggregate shall be so deposited that a distance of 100 mm shall be left between the top of the division wall and any part of the aggregate stack.

When stack piling, the aggregate shall not form pyramids resulting in segregation of different size particles. The stacks shall be regular and of a height not exceeding two meters.

### **3.9 GRADES OF CONCRETE**

The grades of concrete shall be in accordance with the following table. The grade of concrete to be used in each section of work will be shown in the drawings or in the Bill of Quantities:

**CHARACTERSTIC STRENGTH**

Grade of Concrete	Grade of Concrete Characteristic strength i.e. compressive strength of 15 cm. Cubes at 28 days (N/mm <sup>2</sup> )	Nominal maximum aggregate size (mm)
10	10	25
15	15	25
20	20	20
25	25	20
30	30	20
35	35	20

Unless otherwise specified in the drawings, the maximum nominal size of coarse aggregates for different grades of concrete shall be as under:

- a) For concreting in very narrow space or in very small thickness 12 mm
- b) For all reinforced concrete work except in massive foundations 20 mm
- c) For all ordinary plain concrete and massive reinforced foundations 10 mm

All mix design grades viz., M10, M15, M20, M25, M30 etc., shall be designed and have a minimum cement content as follows:

Grade	Qty (in kg)
M-10	220
M-15	240
M-20	320
M-25	330
M-30	340

M-35 350

Minimum content of cement remaining unchanged, as specified above for each type of concrete mix, the proportion and quantities of local sand and aggregate are to be worked out and determined in the field/laboratory as per Road Research Note No.4, Department of Scientific and Industrial Research, United Kingdom for design of concrete mixes or as per ACI 613 with the approval of the Engineer. Any change in the source of aggregates will require the re-designing of the concrete mix for the Engineer's approval.

**3.10 Mix Design**

At the commencement of the contract, the Contractor shall make preliminary tests to determine the proportions by weight of cement, fine aggregates, coarse aggregates and water necessary to produce required grades of concrete. The mix proportions shall be selected to ensure that workability of the fresh concrete is suitable for the conditions of handling and placing and when concrete hardens, it shall have the required strength, durability and surface finish. The Contractor shall get approval of the Engineer to such proportions before start of concreting. However, such approval shall not relieve the

Contractor of his responsibility to produce concrete having compressive strengths as laid down in the foregoing table.

No departure from the approved proportions will be permitted during the works unless and until the Engineer gives written authorization for any change in proportion. The Engineer shall have authority at any time to check whether the mixing of concrete is being carried out according to the approved proportions.

For the major and important RC works and for all special works, the design of mixes shall be made by the Contractor at his own cost, for each grade of concrete as well as for various workability. The design of mixes shall be made according to relevant I.S. codes or to approved standard methods.

The concrete made by designing the mix is termed hereinafter as "Design Mix Concrete".

**3.11 Water/Cement Ratio**

Where a particular water/cement ratio is stipulated in the design or drawing along with the characteristic grade of concrete, the design of mix shall be carried out by adjusting the other variable factors to obtain characteristic strength of concrete with stipulated water/cement ratio.

In the structures where the impermeability and shrinkage of concrete have an important bearing on the durability and serviceability of the structures, such as water retaining structures, basements, underground premises, tunnels, pump houses, exposed structures near sea side or deserts, pre-stressed structure, thin precast members etc., the water/cement ratio shall be kept low and preferably not exceeding 0.45.

The water cement ratio as achieved in the mix design or as specified in the drawings shall be adhered to strictly and shall not be varied without the permission of the Engineer.

**3.12 Workability**

The workability of fresh concrete shall be such that the concrete is just suitable for the conditions of handling and placing so that after compaction, it becomes completely consistent and homogeneously surrounds all the reinforcement and completely fills the formwork.

The workability of fresh concrete at the place of batching/mixing shall be measured by compacting factor test and at the place of disposition by means of slump test. During the finalization of trial mixes, the relationship between compacting factor and slump test shall be established for each grade of concrete as well as for various levels for workability.

Normally, in the condition of low water cement ratio as well as for medium/high workability, the workability shall be achieved by increasing the cement content.

In cases where the cement content is to be limited to reduce the heat of hydration, and the water / cement ratio is also to be kept low to reduce the permeability or due to other requirements the desired workability may be achieved with the use of limited doses of plasticizer or air entraining agent. In such cases, the method of mixing and dosage of the plasticiser / air entraining agent shall be according to the manufacturer's specification and with the approval of the Engineer.

Consistency and workability of concrete shall be checked by measuring the slump of a truncated cone of concrete straight from the mixer under normal working conditions. The conical mould shall be of metal, 300 mm high and 100 mm and 200 mm in diameter at top and base respectively.

Moulds shall be prepared by the Contractor. The slump range of concrete shall be as per the tabulation given below, as well as standards.

Slump tests shall be performed as per IS:1881 at intervals established by the Engineer at the Contractor's cost in such a way as to check that the degree of consistency established by the Engineer for work in progress is maintained. The table below gives the general slump range to be followed for various types of construction unless otherwise shown on drawings or instructed by the Engineer.

Various types of construction ....	Slump (in mm)...	Max. Min.
Reinforced foundation walls and footings	80	35
Plain footings, caissons and structure walls	75	30
Compressor foundations and for heavy mass constructions	50	20
Pumps and other misc. equipment foundations	75	35
Columns, slabs, beams and reinforced walls	100	50

**3.13 Durability**

The durability of concrete, depending on the exposure condition, is to be taken into account while designing the mix. For given aggregates, the cement content should be sufficient to make



sufficiently low water/cement ratio and Appendix A of IS: 456 shall be taken as guideline for durability considerations.

### **3.14 Trial Mixes**

After approval of the mix design by the Engineer, the Contractor shall make in presence of the Engineer the trial mixes for each grade of concrete as well as for required workability.

Before starting the trial mixes, necessary preparatory works like determination of sieve analysis of the aggregates, densities of different ingredients, moisture contents in the aggregates, shall be completed according to the relevant BIS Codes.

Each trial mix shall be handled and compacted by the method which the Contractor proposes to use for that mix in the works and the mixes shall not show tendency of inadequate compaction by the method proposed.

The compacting factor and the slump of each trial mix shall be determined immediately after mixing and the values shall not exceed the maximum value obtained in the mix design.

Five (5) 150 mm test cubes shall be made from each trial mix. These shall be cured and tested in accordance with relevant BIS codes. In order to have the specified characteristic strength in the field, the concrete mix as designed in the design mix shall have higher average compressive strength depending on the degree of quality of control at site.

Before commencement of the concreting works of particular grade of concrete, the Contractor must complete the work of trial mixes and subsequent testing of the test cubes obtained there from and the desire of the approved mix for that particular grade of concrete.

The entire cost of all the trial mixes including all the preparatory works for trial mixes, preparation of test cubes and their testing shall be borne by the Contractor.

### **3.15 Nominal Mix Concrete**

Nominal mix concrete may be used for all concrete of grade M-10 and below. If design mix concrete cannot be used for any reason for grade M-15 and M-20, nominal mix concrete may be used with the permission of the Engineer. Nominal mix concrete shall be in accordance with Table-3 of clause 8.3 of IS 456. The stipulations of clauses 8.3.1 and 8.3.2 of IS: 456 shall also be taken into consideration..

### **3.16 Volumetric Mix Concrete**

**Where concrete is specified in volumetric proportions such as 1:4:8, 1:3:6, 1:2:4, 1:1.5:3, 1:1:2 etc., in the Bill of Quantities, coarse & fine aggregates shall be measured by volume & cement by weight. The water cement ratio shall be within 0.45 & 0.70 depending upon the workability.**

### **3.17 Batching of Concrete**

#### **3.17.1 Cement**

Cement shall always be batched by weight. A separate weighing device shall be provided for weighing cement. Where the weight of cement is determined by accepting the weight per bag, a number of bags shall be weighed separately to determine the average net weight of cement per bag and the same shall be checked regularly.

#### **3.17.2 Aggregates:**

For both design mix concrete and nominal mix concrete, the aggregates,(coarse and fine) shall be batched by weight.

In particular cases, or where weight-batching is not possible, proportioning by volume batching may be allowed by the aggregates throughout the period of construction. For this purpose, the

Contractor shall submit to the Engineer sufficient data indicating the weight/volume relationship of the aggregates shall be made by the Contractor to the satisfaction of the Engineer. Where aggregates are moist and volume batching is adopted, allowance shall be bulking in accordance with IS (Part III). Suitable adjustments shall be made for the variation in the weight of aggregates due to variation in their moisture contents.

### 3.18 Water

#### 3.18.1 General

Water may be measured either by weight or by volume. When measured by volume, it shall be by well calibrated conical shaped jar or vessel or from a calibrated tank filled to the mixer.

**Adjustment of Water Due to Moisture Contents in Coarse and Fine Aggregates** It is very important to maintain the water cement ratio constant at its correct value. For the correct determination of the amount of water to be added in the concrete mix, to maintain the water cement ratio constant, the amount of moisture content in both coarse and fine aggregates shall be taken into consideration, be checked as frequently as possible, the frequency for a given job being determined by the Engineer according to weather condition.

#### Determination of Moisture Content in the Aggregates

Determination of moisture content in the aggregates shall be according to IS 2386 (Part-III). Where tests are not conducted, the amount of surface water may be estimated from the following table:

Aggregates	Surface water Carried by Aggregates	
	% by weight	l/m <sup>3</sup>
Very wet sand	7.50	120
Moderately wet sand	5.00	80
Moist San	2.50	40
Moist gravel stone	125.25	20-40
chips*		

\* coarser the aggregate, less the water it will carry

### 3.18.2 Admixtures

Any solid admixture, to be added, shall be measured by weight, but liquid or semi-liquid admixture may be measured by weight or volume.

The Bidder shall indicate the brand name, the Manufacturer and the properties of any admixture to be used for the concrete as per Bill of Quantity items or on his own initiative.

### 3.18.3 Accuracy of Batching

The accuracy of batching shall be within the following tolerance:

- 1 Cement within + 2% by weight
- 2 Aggregate within + 5% by weight
- 3 Water within + 0.5% by weight.

### 3.19 Mixing of Concrete

#### 3.19.1 Machine Mixing

Concrete shall always be mixed in mechanical mixer. Water shall not, normally, be charged into the drum of the mixer until all other ingredients are already in the drum and mixed for at least

one minute. Mixing shall be continued until there is uniform distribution of materials and the mass is uniform in colour and consistency. The mixing time from the time of adding water shall be in accordance with IS 1791, but in no case less than 2 minutes or at least 40 revolutions.

**3.19.2 Hand Mixing**

When hand mixing is permitted by the Engineer, it shall be carried out on a water tight platform and care shall be taken to ensure that mixing is continued until the mass is uniform in colour and consistency. In case, of hand mixing, 10% extra cement shall be added to each batch at no extra cost to EMPLOYER,

**3.20 Transportation of Concrete**

Concrete shall be transported from the place of mixing to the place of placing concrete as rapidly as practicable by any means, which will prevent the segregation or loss of any of the ingredients and maintain the required workability. No water shall be mixed with the concrete after it has left the mixer.

Where concrete is transported over long distances, the Contractor shall provide suitable means by which different grades of concrete are readily identifiable at the place of final deposit.

**3.21 Preparatory Works/Surface Preparation**

**3.21.1 For Concrete Directly on Earth Foundation**

Earth foundation on which direct placement of concrete is specified, shall be rammed and consolidated as directed by the Engineer such that it does not crumble and get mixed with concrete during or after placement. If the foundation is quite wet, the same shall be kept dry and then sufficiently consolidated, if necessary, a thin top layer of the wet soil shall be removed and replaced by sand or other suitable materials as directed by the Engineer without extra cost to EMPLOYER, Care shall also be taken that earth from the sides also does not get mixed with the concrete, during or after placement, before it has sufficiently set and hardened.

The earth foundation, over which concrete is to be placed directly, shall not be kept abandon at the specified level and concrete shall be placed immediately following otherwise suitable measures shall be taken, as directed by the Engineer **without extra cost** to EMPLOYER.

**3.21.2 For Construction Joints**

Concrete shall be cast, as far as possible, continuously until the parts of structure to be built are finished. Should this not be feasible, the type, number and location of construction joints shall be approved by the Engineer prior to placing concrete.

All such joints shall have continuous square bond grooves to produce substantial and water-tight-key and the exposed faces of joints shall be monolithic with the main mass of concrete formed and completed under substantially shattered faces. The Contractor shall take all the necessary steps by means of timber edgings etc. to ensure an exact horizontal straight finish to outside edge of any lift of concrete. Subject to the approval of the Engineer, the Contractor is at liberty to arrange his own construction joints but the following restrictions are to be observed:

1. There shall be no vertical construction joints
2. No longitudinal joints shall be made in the walls and floors of trenches and pits unless otherwise shown in the drawings.
3. Concrete pouring shall be reasonably large, but in no case shall the height of pouring concrete exceed 1.5 m without the Engineer's firm approval. Such approval of the Engineer shall not in any way relieve the Contractor of his responsibility to ensure that the construction is water tight and that no segregation takes place.
4. Laitance shall be removed from the surface of concrete before it has set hard by washing and wire brushing so as to expose the stones of the top layer without undue erosion of the mortar or damage to the under laying concrete.

All beds and joints in concrete faces, which have become set, are to be picked all over and all loose materials removed before fresh concrete is deposited thereon. The indentations shall be at least 12 mm deep and not less than seventy five percent of the area of the existing concrete face to be covered over.

Immediately before depositing fresh concrete, the exposed surface shall be cleaned of foreign matter by further wire brushing, if necessary. It shall then be thoroughly washed and surplus water removed. The surface, while still moist, shall be covered with layer of 1:1 cement mortar which must be vigorously stippled into the surface by means of a stiff brush, the depositing of the fresh concrete following on closely. Pockets to form keys shall be left in the surface of the concrete at constructional joints, 75 mm deep and approximately **equal to 20% of the exposed surface.**

All costs in connection with the forming of construction joints shall be to the account of the Contractor and shall be deemed to be included in the rates for concreting and formwork and shall not be separately paid for. In a column, the joint shall be formed 75 mm below the lowest soffits of the beams, including haunches, if any.

Concrete in a beam shall be placed throughout without a joint but if the provision of a joint is unavoidable, then the joint shall be vertical and at the centre of, or within, middle third of the span, unless otherwise shown on the drawings.

### **3.21.3 On Vertical Surfaces of Masonry**

When the concrete is placed on the vertical surface of masonry (as in the case of thin concrete fins projected from the vertical masonry surface), a groove of dimension as directed by the Engineer shall be cut in the masonry to ensure a proper bond and the surface shall be cleaned thoroughly. Before the placement of concrete, the surface shall be kept moist by spraying water at least for the period of 2 hours and a thick coat of cement slurry shall be applied immediately before the placement of concrete.

Inside the Form Works (Cleaning, Surface Preparation etc.)

The interior of the form works, where the concrete is to be placed, shall be thoroughly washed by high pressure water jet or air jet to completely clean the entire volume from the dirt, grease/oil foreign and deleterious materials etc. The reinforcements shall be completely cleaned and free from all sorts of dirt, grease/oil, rust, foreign/deleterious materials etc. Before placement of concrete, the form works coming in contact with concrete, shall be coated highly with form oil or raw linseed oily material or provided with any approved material to prevent adhesion of concrete to the form work, but utmost care shall be taken so that such oily material does not come in contact with the reinforcement.

### **3.22 Placing and Compaction of Concrete**

Before placing the concrete, the Contractor shall ensure that:

1. All mixing and placing equipment is thoroughly cleaned
2. All concreting space is free from debris and rubbish
3. All forms have been thoroughly wetted or oiled and firmly installed in line and plumb to the Engineer's approval.
4. All reinforcement is cleaned of loose rust, scales and other injurious adherents and is firmly bound and correctly placed and has been so approved by the Engineer.
5. All inserts, sleeves, foundation bolts and embedded parts have been correctly and firmly installed to conform to the Engineer's drawings and have been carefully checked to comply with the drawings. Special care shall be taken to locate and check sleeves or inserts, which may not be symmetrically placed with respect to centre lines.

The Contractor and Engineer shall separately inspect and check the above mentioned points and record and sign the results in a register which shall be maintained by the Contractor in an approved form. No concrete shall be placed without the Engineer having inspected and

approved in writing. In spite of ensuring the above requirements, the Contractor shall fill pour cards furnishing the necessary details of the job, duly signed by the Engineer. This, however, will not absolve the Contractor from his responsibility to correctly execute the work. Pour cards shall contain the following information:

Design Index

- Date
- Slump
- Workability
- Work test specimen
- Type of finishing and admixtures used (if any)
- Period of removal of shuttering/props/forms.

a. The concrete pouring method shall be submitted to the Engineer for approval and shall always be such as to avoid any possibility of segregation of the components or shifting of the reinforcement.

b. Special grout or mix shall be used for difficult and intricate locations as specified by the Engineer. During placing, the concrete shall be thoroughly worked around reinforcement, embedded parts and corners of the formwork.

c. Greatest possible care shall be taken by the Contractor that reinforcement and embedded parts, particularly foundation bolts and sleeves, are not displaced during placement of concrete. While concreting mats and other such locations where top and bottom reinforcement are adopted, top reinforcement shall be thoroughly cleaned of all slurry and mortar sticking to them at the time of concreting top layers.

d. The concrete shall be placed and compacted before setting commences and should not be subsequently disturbed. No water shall be mixed with the concrete after it has left the mixer. Method of placing should be such as to preclude segregation. Approved mechanical vibrator shall be used for compacting concrete, and concrete shall not be non vibrated or under vibrated. No concrete shall be placed until the place of deposit has been thoroughly inspected and approved by the Engineer, all inserts and embedment properly secured in position and checked and forms properly oiled. No concrete shall be placed in the absence of the Engineer.

e. Concrete shall be placed on clean bed having the designed level. The bed shall be cleaned of all debris and other objectionable materials. Seepage water, if any, shall be controlled or diverted.

f. Concreting shall not be carried on during rains unless all precautions have been taken by the Contractor and necessary permission has been given by the Engineer. Suitable measures shall be taken to control the temperature of concrete.

g. Where plums are permitted in massive concrete, they shall be washed and carefully placed. No stone shall be closer than 30 cm to an exposed face, nor nearer than 15 cm to an adjacent stone.

h. Concrete shall not be dropped from a height of more than 2 m except through a chute, the design and type of which shall be subjected to approval of the Engineer.

i. The concrete shall be placed, spread and compacted by approved mechanical vibrator. Vibrators shall not be used for pushing concrete to adjoining areas.

j. For members involving vertical placing of concrete (e.g. columns, walls etc.), each lift shall be deposited in horizontal layer extending for the full width between shuttering and of such depth that each layer can be easily and effectively vibrated and incorporated with the layer below by means of compaction being employed.

k. For members involving horizontal placing of concrete (e.g., slabs, beams etc.), the concrete shall be placed along the line of starting point in such quantities as will allow members to be cast to their full depth along the full width between side shuttering and then gradually brought towards the finishing point along its entire front parallel to the starting line. Vibration and surface finish shall follow behind the placement as closely as possible.

l. Utmost care shall be taken to avoid the displacement of reinforcements/ embedded parts or movement of form work or damage to faces of the form work or transmission of any harmful vibration/shocks to the concrete which has not yet hardened sufficiently.

- m. All members shall be concreted at such a rate that no cold joint is formed and fresh concrete is placed always against green concrete, which is still plastic and workable.
- n. Should any unforeseen occurrence result in a stoppage of concreting for one hour or such other time as might allow the concrete, already placed, to begin to set before the next batches can be placed, the Contractor shall make at his own cost, suitable tongue, and groove construction joint, as approved by the Engineer. Any additional reinforcement required as directed by the Engineer shall also be provided by the Contractor at his own cost. Before placement of new batches of concrete over that construction joint, the surface preparation according to this specification stipulated earlier, shall be done by the Contractor.
- o. The concrete shall be worked well up against whatever surface it adjoins and compacted to such a degree that it reaches its maximum density as a homogeneous mass, free from air and water holes and penetrates to all corners of moulds and shuttering and completely surrounds the reinforcement. All measures shall be taken to make the shape, size, and location of the finished concrete including its embedment, holes, openings etc, well within the accepted tolerance limit.

### 3.23 Construction Joints

Normally, the construction joints including crack inducing joints shall be constructed as per locations and details indicated on the drawings. Where the location of the joint is not specified in the drawings, it shall be in accordance with the following guidelines. In all construction joints, the reinforcements shall pass through as per drawings and the same shall not be disturbed in any way.

- a) In Columns
  - i) In case of Projection from **Basement Slab, 300 mm from the top of base slab or 75 mm from the top of the haunches whichever is higher.**
  - ii) In framing the beam at different elevation, 75 mm below the lowest soffit of the beam and in case of projection from beams and slabs 75 mm from the top surface of the beam/slab or at the top surface of beam/slab whichever facilitates formwork.
  - iii) For columns below flat slabs, 75 mm below the lowest soffit of the slab.
- b) In Walls (Horizontal Construction Joints)
  - i) For Walls Projecting From Base Slab, 300 mm from top of base slab.
  - ii) For Walls supporting the suspended slab, 75 mm from the lowest soffit of the slab.

Note: In the case of water retaining structures and structures under the influence of ground water, approved water bars of suitable size shall be provided to make the joint completely watertight.

- c) In Beams
 

Beams shall be cast, as a rule, without a joint. But if provision of a joint is unavoidable, the joints from simply supported beam shall be vertical and at the middle of the span; in continuous beam, the same shall be at the point of minimum shear force.
- d) In Suspended Slabs
  - i) In slab of small span, there shall be reconstruction joints.
  - ii) In slabs of large span and continuous slabs, the Construction joint, if allowed by the Engineer, shall be vertical at the middle of span and at right angles to the principal reinforcement.
- e) In Walls (Vertical Construction Joint)

As a rule, walls shall be cast monolithically without any vertical construction joint, unless specified in the drawing. However, for a long wall, Engineer may allow vertical construction joint and the same shall be at the place of minimum shear force.

- f) In Slabs Resting on Ground

- i) For Plain Concrete  
Concreting shall be done in alternate panels not exceeding  $10\text{ m}^2$  in area. The largest panel dimension shall be 5 m.
- ii) For Nominally Reinforced Slab The area of pour shall not exceed  $40\text{ m}^2$  and the maximum panel dimension shall not exceed 8m.
- iii) For the Basement Slabs Which Act as Structural Member There shall be no construction joint.
- g) In Ribbed Beams The beams shall be monolithic with the slab in one continuous operation.

### **3.24 Cold Joints :**

An advancing face of pour, which could not be covered before expiry of initial setting time for unexpected reasons, is called a cold joint. The Contractor shall remain always vigilant to avoid cold joints. If however, a cold joint is formed due to unavoidable reasons, the following procedures shall be adopted for treating it:

1. If the concrete is so green that it can be removed manually and if vibrators can penetrate the surface without much effort, fresh concrete can be placed directly over the old surface and the fresh concrete along with the old concrete shall be vibrated systematically and thoroughly.
2. In case the concrete has hardened a bit more than (1), but can still be easily removed by a light hand pick, the surface shall be raked thoroughly and the loose concrete removed completely without disturbing the rest of the concrete in depth. Then a rich mortar layer of 12 mm thickness, shall be placed on one cold joint and then the fresh concrete shall be placed on the mortar layer and vibrated thoroughly penetrating deep into the layer of concrete.
3. In case the concrete at the joint has become so stiff that it cannot be remoulded and mortar or slurry does not rise in spite of extensive vibration, a tongue and groove joint shall be made by removing some of the older concrete and the joint shall be left to harden at least for 12-24 hours. It will then be treated as regular construction joint and the surface preparation of the same, before placement of concrete, shall be as described in the appropriate clauses of these specifications.

### **3.25 Sub-standard concrete**

Should the work strength of controlled concrete fall below the specified strength, Engineer shall decide:

1. To reject the work, in which case the Contractor shall replace the defective work with concrete of required strength and bear all costs for dismantling and replacing including cost of associated form work, reinforcement, embedded parts & all associated works.
2. To accept the work at a reduced rate, in which case the unit rate payable for sub-standard work will be reduced by EMPLOYER, directly in proportion to the work strength as compared to the specified strength. The Engineer may, in addition, require other tests performed on the respective structural member so accepted period to its acceptance with or without necessary corrective measures and in each such case, the Contractor shall bear all costs for all such tests or corrective measures, besides the reduction in the unit rates as specified herein.
3. Concrete of strength below fifteen (15) percent of the specified strength will not be accepted.
4. The test load shall be 125% of the maximum superimposed load for which the structure was designed. Such test load shall not be applied before 56 days after the effective hardening of concrete. During the test, struts strong enough to take the whole load shall be placed in position leaving a gap under the members. The test load shall be maintained for 24 hours before removal.

5. If, within 24 hours of the removal of the load, the structure does not show a recovery of at least 75% of the maximum deflection shown during the 24 hours under load, the test loading shall be repeated after a lapse of atleast 72 hours. The structure shall be considered to have failed to pass the test if the recovery after the second test is not at least 75% of the maximum deflection shown during the second test. If the structure is certified as failed by the Engineer, the cost of the load test shall be borne by the Contractor.

### **3.26 Optional Tests**

The Engineer, if he so desires, may order tests to be carried out on cement, sand, coarse aggregate, water in accordance with the relevant Indian Standards.

Tests on cement shall include

1. Fineness test
2. Test for normal consistency
3. Test for setting time
4. Test for soundness
5. Test for tensile strength
6. Test for compressive strength
7. Test for heat of hydration (by experiment and by calculation) in accordance with IS:269.

Tests on sand shall include

1. Sieve test.
2. Test for organic impurities.
3. Decantation test for determining clay and silt content.
4. Specific gravity test.
5. Test for unit weight and bulkage factor.
6. Test for sieve analysis and fineness modulus.

Tests on coarse aggregates shall include

1. Sieve analysis.
2. Specific gravity and unit weight of dry, loose and rodded aggregate.
3. Soundness and alkali aggregate reactivity.
4. Petrographic examination.
5. Deleterious materials and organic impurities.
6. Test for aggregate crushing value.

Any or all these tests would normally be ordered to be carried out only if the Engineer feels the materials are not in accordance with the specifications or if the specified concrete strengths are not obtained and shall be performed by the Contractor at an approved test laboratory at the cost of the Contractor. If the work cubes do not give the stipulated strengths, the Engineer reserves the right to ask the Contractor to dismantle such portions of the work which, in his opinion, are unacceptable and re-do the work to standards stipulated, at the Contractor's cost. The unit rate for concrete shall be all inclusive, including making preliminary mix design and test cubes works, cubes, testing them as per specification, slump tests, optional tests etc.,

### **3.27 Concrete for Equipment or steel structures foundations:-**

Concrete for equipment foundation, whether principal or auxiliary, shall be poured continuously so that the structure becomes monolithic, particular care being exercised to see that the base slabs, if any, are of compact impervious construction. Tunnels, passages, apertures and so forth shall be provided in accordance with the drawings for the installation of mechanical and electrical equipment, pipes or cables. The top elevation of the equipment foundations or parts shall be accurately cast to 20/50 mm (or more as may be specified on the drawings) above the level required for grouting and it shall be pneumatically chiseled off and well roughened just prior to the erection of the equipment concerned. All embedded anchor bolts or bolt sleeves shall be accurately and firmly set with the aid of approved templates, steel supports and/or other accessories. For holding the embedded bolts or sleeves in the correct position during concreting, template shall have to be of steel of suitable section approved by the Engineer. Two sets of



templates shall have to provided, one to hold the bottom and the other the top of the bolts or sleeves. The bottom template shall be securely and rigidly fixed by providing anchorage arrangement and by welding to the lowest part of the steel reinforcement and other structural supports. The top templates shall be securely fixed by tying with guy wires and turn buckle arrangements to firm and rigid adjoining structures and staging. The bottom template that is embedded in concrete will be measured and paid for as embedded steel.

Bolt pockets, where required, shall be cast with wooden taper wedges. These shall be withdrawn at an appropriate time when the concrete has set, the pockets cleaned, roughened and then covered or blocked thoroughly to prevent debris getting into these. The exposed portions of bolts and embedded parts shall be kept well greased and adequately protected from damage throughout construction. Any damages found shall have to be corrected at the Contractor's cost. EMPLOYER, shall have the right to use the foundations, pads, piers, slabs, floors and all concrete work as needed for other works or equipment erected prior to its "Taking Over".

### **3.28 Requirements for Concreting in Special Cases**

#### **3.28.1 Concreting in Deep Lifts**

N.A.

#### **3.28.2 Concreting Under Water**

N.A.

#### **3.28.3 Cold Weather Concreting**

N.A.

#### **3.28.4 Hot Weather Concreting**

N.A.

#### **3.28.5 Concreting in Large Pours (Mass Concrete)**

N.A.

### **3.29 Finishes to Exposed Surface of Concrete**

The Contractor is to include his quoted rate for concrete, the provision of normal finishes in both formed and unformed surfaces as and where required by the Engineer without any extra cost to EMPLOYER, Some common finishes are indicated below:

#### **3.29.1 Surfaces which do not Require Plastering**

Surface in contact with casing shall be brought to a fair and even surface by working the concrete smooth against casings with a steel trowel while it is being deposited and also by working over the surface with a trowel immediately after the removal of the casings or centering, removing any irregularities and stopping air holes, etc. Use of mortar plaster is not permissible for correcting levels, removing unevenness etc. However, if in the opinion of the Engineer, such plastering is unavoidable, then the thickness of plaster shall in no case exceed 5 mm and the plastering shall be in CM (1:3).

#### **3.29.2 Faces of Foundations which will be Back Filled**

Neither the smoothness of the surface not the positions of the joints in the form work are important. Small blemishes caused by entrapped air are permitted. No special surface finish is required.

#### **3.29.3 Exposed Surfaces**

Surface of beams/columns flushing with the block work or other structures where it is intended to plaster, shall be backed adequately as soon as the shuttering is stripped off so that proper bond with the plaster can develop.

**3.29.4 Surface for Non-integral Finish**

Where a non integral finish such as floor finish is specified or required, the surface of the concrete shall be struck off at the specified levels shall be furnished and finished rough.

**3.29.5 For Monolithic Finish**

Where no more finishing course is to be supplied as in the case of basement floor, industrial flooring or the screed concrete flooring etc., the concrete shall be completed and struck off at the specified levels and slopes in a screed board and then floated with a wooden float. Steel trowel ling is then started after the concrete has hardened enough to prevent the excess of fines and water to rise to the surface but not hard enough to prevent proper finishing. Trowelling shall be such that the surface is flat, smooth and neatly finished.

**3.30 Curing of Concrete**

**3.30.1 General**

The purpose of curing is either to provide sufficient water at optimum temperature or to prevent loss of moisture from the concrete itself so that the cement inside the concrete is sufficiently hydrated which, of course, is a slow and prolonged process. As soon as the concrete has hardened sufficiently, the curing shall be started.

**3.30.2 Different Methods of Curing**

Any one of the following may be used for curing as approved by the Engineer.

a) Curing by Direct Water

This is done either by pounding or spraying water.

**Ponding**

Ponding is widely used for curing slabs and pavement. Earth bands are formed over the slabs and water is pumped or poured into them and the same is replenished at interval to make up for the loss of evaporation. As this type of curing is one of the best methods, 10 days of curing after final setting is sufficient.

By Spraying Water Curing is done by spraying water by suitable means at approved time intervals. While spraying, it shall be ensured that the complete area is covered. In order to avoid cracking, cold water shall not be applied to massive members immediately after striking the form work, while the concrete is still warm.

Alternative wetting and over drying shall be avoided.

Curing by spraying water shall be continued atleast for 18 days.

a) Curing of Concrete with Absorbent Material Kept Damp The entire concrete surface is covered either with hessian, burlap, sawdust, sand, canvas or similar material and kept wet continuously for at least 12 days after final settings.

b) Curing by Covering Concrete Surface with an Impressive Sheet This is achieved by covering the entire concrete surface with water proof paper or plastic sheets specially manufactured for this purpose. The waterproof papers are stuck together by adhesive compound and the plastic sheets can be welded at site. Such type of covering shall be kept at least for 24 days after the final setting. It is preferable to have sheet as white in appearance since the white colour will reflect hot sunrays and keep the concrete temperature at reasonable level.

c) Curing by Providing Protective Membrane by Applying curing compound This is achieved by applying a membrane forming compound (curing compound) over the concrete surface. Generally, these are available in the emulsion form. The application of the curing compound should be started immediately after stripping off the shuttering in case of formed surface and after the surface has hardened in case of unformed surface.

The curing compound membrane forming emulsions dry up within 3 to 4 hours after application and forms a continuous coherent adhesive membrane over the concrete surface. Such membrane serves as a physical barrier to prevent the loss of moisture from the concrete itself. Membrane forming emulsions are generally coloured black or white to improve visibility for ensuring uniform application. Black colour shall never be used for curing in very hot weather. In order to prevent glare, a colouring pigment may be added to white compounds. Black curing compounds are either Bituminous or Asphaltic emulsions and shall be used to surfaces which are to be covered by back filling or on the floor which is to be covered with tiles and linoleum.

White curing compound shall be used for the surfaces of tall structures under exposure of hot sun where other method of curing can not be properly ensured.

d) Curing by Chemical Coating For chemical curing, sodium silicate or calcium chloride is used. The use of calcium chloride shall be done with the approval of the Engineer. Normally, the sodium silicate mixed with water is applied over concrete surface and, when it dries up, it forms a thin varnish like film, which fills up the pores, and surface voids and prevents evaporation of water. This also acts like curing compound but only difference is that curing compounds are available in ready mixed emulsion forms while sodium silicate is to be mixed with water at site.

### **3.30.3 Limitation to Use of Different Methods of Curing**

i) Curing by the processes as indicated in Section B – Clause 3-24 and more specifically as per sub-clause 2(b) of the above clause gives very good results in normal warm climate for maturity of concrete. ii) In cold weather, the process as indicated in sub-clause 2(b) of clause 3-24 gives very good result for maturity of concrete. iii) Where water cement ratio is less than 0.5, the methods indicated in sub-clause 2(d) and 2(e) of clause 3-24 of Section B, shall not be used. iv) In warm climate also, where the methods of curing as indicated in sub-clauses 2(a) and 2(b) of clause 3-24 cannot be properly ensured, any suitable method of curing as indicated in subclasses 2(c) to 2(e) of clause 3-24 of Section B, as approved/directed by the Engineer, shall be adopted.

## **3.31 Testing of Concrete**

### **3.31.1 General**

The Contractor shall carry out, entirely at his own cost, all sampling and testing in accordance with the relevant IS standards and as supplemented herein. The Contractor shall get all tests done in an approved laboratory and submit to the Engineer, the test result in triplicate within 3 days after completion of the test.

### **3.31.2 Consistency Test (Tests of Fresh Concrete)**

At the place of deposition/pouring of the concrete, to control the consistency slump tests and/or compacting factor tests shall be carried out by the Contractor in accordance with IS 1199 as directed by the Engineer.

The results of the slump tests/compacting factor tests shall be recorded in a register for reference duly signed by both the Contractor and the Engineer. That register shall be considered as the property of EMPLOYER, and shall be kept by the Contractor at site in safe custody.

The results of the slump tests/compacting factor tests shall tally, within accepted variation of 12%, with the results in the respective design mix, in case of mix design concrete and with the values indicated in the table under clause 6.1 of IS:456 in case of nominal mix concrete. For any particular batch of concrete, if the results do not conform to the requirements as specified in IS 456, the Engineer has the right to reject that batch and the Contractor shall remove the same immediately from the site, at no cost to EMPLOYER,.

**3.31.3 Strength Test of Concrete**

While placing concrete, the Contractor shall make six (6) 150 mm test cubes from particular batches of concrete as desired by the Engineer. The frequency of taking test cubes shall be either according to clause 14.2 of IS:456 or as directed by the Engineer.

The cubes shall be prepared, cured and tested according to IS 516. Out of the six (6) test cubes, 3 shall be tested for compressive strength at 7 days after casting and the remaining 3 at 28 days after casting. A register shall be maintained at site by the Contractor with the following details entered and signed by both the Contractor and the Engineer. That register shall be considered as the property of EMPLOYER,

- a) Reference to the specific structural member
- b) Mark on cubes
- c) The grade of concrete
- d) The mix of concrete
- e) Date and time
- f) Crushing strength at 7 days
- g) Crushing strength at 28 days
- h) Any other information directed by the Engineer.

**3.31.4 Acceptance Criteria for Test Cubes**

The acceptance criteria of concrete on strength requirement shall be in accordance with the stipulations under clause 15 of IS:456.

**3.31.5 Non-destructive Tests on Hardened Concrete**

If there is doubt about the strength or quality of a particular work or the test results do not comply with the acceptance criteria as stipulated under clause 15 of IS:456, non-destructive tests on hardened concrete like core tests and/or load tests or other type of non destructive tests like ultrasonic impulse test etc. shall be carried out, as may be directed by the Engineer, by the Contractor at entirely his own cost. The core tests and load tests shall comply with the requirements of clause 16.6 of IS: 456.

**3.31.6 Concrete Below Specified Strength**

In case of failure of test cubes to meet the specified requirements, the Engineer may take one of the following actions:

1. Reject the work and instruct that section of the works to which the failed cubes relate shall be cut out and replaced at the Contractor's expense.
2. Instruct the Contractor to carry out additional tests and/or works to ensure the soundness of the structure at the Contractor's expense.
3. Accept the work with reduction in the rate in appropriate item.

**3.31.7 Concrete failed in Non-destruction Tests**

In case test results of the core tests or load tests in a particular work do not comply with requirements of respective clause (16.3 for core test and 16.5 for load tests) of IS 456, the whole or part of the work concerned shall be dismantled and replaced by the Contractor as may be directed by the Engineer at no extra cost to EMPLOYER, and to the satisfaction of the Engineer. No payment for the dismantled concrete including relevant form work, reinforcement, embedded fixtures etc. shall be made. In the course of dismantling if any damage occurs to the adjacent structure or embedded item, the same shall be made good, free of charge by the Contractor, to the satisfaction of the Engineer.

**3.32 EXPANSION JOINTS**

**3.32.1 GENERAL**

Expansion joints shall be provided where shown on the drawings or as directed by Consultant. They shall be constructed with an initial gap between the adjoining parts of the works of the width specified in the drawings.

The contractor shall ensure that no debris is allowed to enter expansion joints. Expansion joints shall be provided as per drawings. Contractor shall ensure that expansion joints are made water-tight and that no leakage occurs through these joints for which he shall be responsible to redo at his own cost.

**3.32.2 OPEN JOINT FILLERS**

Where shown on the drawings, open joints in the structure shall be filled with joint fillers.

The joint filler shall be easily and uniformly compressible to its original thickness, tappable, easily cut or sawn, robust, durable, resistant to decay due to termite or weathering, unaffected by water and free of any constituent which will bleed into or stain the concrete.

The joint filler shall be of same thickness of the joint width, it shall extend through the full thickness of the concrete unless otherwise specified and shall be sufficiently rigid during handling and placing to permit the formation of straight joints.

**3.32.3 JOINT SEALING COMPOUNDS**

Joints sealing compounds shall seal joints in concrete against the passage of water, prevent the ingress of grit or other foreign material and protect the joint filler. The compound shall have good extensibility and adhesion to concrete, shall have good extensibility and adhesion to concrete surfaces and shall be resistant to flow and weathering. Polysulphide joints where specified on the drawings shall be sealed with polysulphide liquid polymer, stored, mixed, handled, applied and cured strictly in accordance with dimensions, thoroughly cleaned and treated with recommended primer strictly in accordance with the manufacturer's written instructions prior to sealing. The Contractor shall use only competent personnel experienced in the application of polysulphide for such work. Where specified in the drawings, rubber/bituminous based sealant shall be of an approved manufacturer. The treatment of the joint and the use of sealing compound shall be strictly in accordance with the manufacturer's written instructions.

**3.32.4 WATER BARS**

Where water bars are shown on the drawings, the joints shall incorporate an approved PVC external type water-bar complete with all necessary molded or prefabricated intersection pieces assembled in accordance with the drawings, with bends and butt joints in running lengths made by heat welding in an electrically heated jig.

Jointing and fixing of water-bars shall be carried out strictly in accordance with the manufacturer's written instructions.

The water-bars shall be installed so that they are securely held in their correct position during the placing and compacting of the concrete.

Where reinforcement is present adjacent to water-bars, adequate clearance shall be left between the reinforcement and water-bars to facilitate the concrete.

**3.33 CRACKS**

If any cracks develop in the reinforced cement concrete construction which in the opinion of the Consultant may be detrimental to the strength of the construction, the contractor at his own expense shall test the structural element in question. If under these test loads the cracks shall develop further, the contractor at his own expense shall dismantle the construction, cart away the debris, replace the construction and carry out all consequential work there to at no extra cost.

If the cracks are not detrimental to the stability of the construction in the opinion of the Consultant, the contractor at his own expense shall grout the cracks with pneumatically applied mortar. At his own expense and risk he shall also make good all other building works such as plaster, molding, surface finish of floors, roofs, ceiling etc. which in the opinion of the Consultant have suffered damage either in appearance or stability owing to such cracks.

The repair work shall be carried out to the satisfaction of the Consultant/Project-in-charge. The decision of the Consultant/Project-in-charge as to the extent of the liability of the contractor in the above matter shall be final and binding on the contractor.

**3.34 SUPERVISION**

All concreting work shall be done under strict supervision of the qualified and experienced representatives of the Contractor as well as those of the Consultant. The contractor's Engineer and supervisor who are incharge of concreting work shall be skilled in this class of work and shall personally supervise all the concreting operations.

Special attention shall be paid to the following:-

- (a) Proportioning, mixing and quality testing of the materials with particular control on the water cement ratio.
- (b) Laying of material in place and thorough compaction of the concrete to ensure solidity and freedom from voids and honey combing.
- (c) Proper curing for the requisite period.
- (d) Reinforcement and inserts/embodiments position are not disturbed during concreting and consolidation by vibration.

**3.35 QUALITY CONTROL**

The Consultant/Project-in-charge reserves the right to make changes in the mix proportions including the increased cement content or/and a change in the Contractor's control procedure, should the quality control during progress of the works prove to be inadequate in his opinion. All the concrete work shall be true to level, plumb and square within the acceptable tolerance. The corners, edges and rises in all cases shall be unbroken and finished properly and carefully.

**3.36 TOLERANCES**

The acceptable tolerances for formed concrete surfaces shall be given below: -

- a) Variation from plumb for -
  - i. Columns and walls to be rendered 6 mm in 3 meters
  - ii. Exposed columns and walls 3 mm in 3 meters
- b) Variation in cross sectional dimensions of columns and beams and in the thickness of slabs and walls: - 6 mm & + 12 mm

All the works executed beyond the tolerance limits are liable to be rejected and no extra cost shall be paid to the contractor for reconstructing the same as desired by the Consultant/Project-in-charge.

**3.37 TESTING ROOM**

A testing room of not less than 10 sqm equipped with the following apparatus and qualified concrete technician, labour and materials required for carrying out tests therein shall be provided by the contractor at his own cost:

- 1. Sieve Set (For aggregate 20 mm down)
  - 40 mm, 20 mm, 16 mm, 12.5 mm, 10 mm, 4.75 mm, 600 micron, 300 micron, and 75 micron having diameter of 45 cms.
- 2. Weighing
  - a) Physical balance cap. 200 gms with weigh box (accuracy 0.5 gm)
  - b) Counter Scale cap 20 Kg
  - c) Weights -
    - 5 kg 1 No 500 gms 1 No.
    - 2kg 2 Nos. 200 gms 1 No.
    - 1 kg 1 No. 100 gms 1 No.

3. Slump Cones 2 Nos
4. 15 cms moulds 18 no.
5. Electric/Kerosene Heater
6. Pans etc. as directed by the Consultant
7. Measuring Cylinders of 1000 ml., 500 ml and 100ml.
8. Wash bottles of the Capacity of 500 ml., 2 Nos.
9. Sink
10. Work benches, shelves, desks and any other furniture and lighting as required by the Consultant.
11. Spring balance dial type cap. 100 kg
12. Litre measures
  - a) 10 Lit 1 No.
  - b) 5 Lit 1 No.
  - c) 2 Lit 2 Nos
  - d) 1 Lit 1 No.
  - e) 1/2 Lit 1 No.
13. Cube Testing Machine 100 Tons.
14. Oven.
15. Cores/ Apparatus for conducting Proctor Density Tests.

### **3.38 CO-ORDINATION OF WORK**

The contractor is fully responsible for coordinating with the other agencies for sanitary, electrical work, etc. to ensure execution of their work related to commencement of concreting. Nothing extra shall be payable to the contractor, if the works pertaining to concreting have to be dismantled and redone due to lack of co-ordination on the part of the contractor in ensuring completion of works of such agencies before concreting had been undertaken.

## **4 SPECIFICATIONS FOR STEEL REINFORCEMENT**

### **4. GENERAL**

#### **4.1 DESCRIPTION**

This section covers the requirements for fabricating, delivering and placing of steel reinforcement in position for casting all types of concrete work

#### **4.1.2 RELATED WORK SPECIFIED ELSEWHERE**

Applicable Codes and Standards:

The codes and standards generally applicable to the work in this sections are listed below: -

IS: 280 Mild wire for general engineering purpose

IS: 432 Part I Mild steel and medium tensile steel bars Part II Hard drawn steel wire

IS: 456 Code of practice for plain and reinforced concrete

IS: 1139 Hot rolled mild steel, medium tensile steel and high yield strength steel deformed bars for concrete reinforcement

IS: 1566 Hard drawn steel wire fabric for concrete reinforcement

IS: 2502 Code of Practice for bending and fixing of bars for concrete reinforcement

The following clauses are intended to amplify the requirements of the reference documents listed above and the contractor/Project-in-charge shall comply with these clauses.

### **4.2 SUBMITALS**

#### **4.2.1. BAR BENDING SCHEDULE**

The Contractor shall prepare Bar Bending Schedule for reinforcement before fabrication

### **4.3 MATERIALS**

#### **4.3.1 STEEL REINFORCEMENT**

Steel reinforcement to be procured by the Contractor for works shall be either of the following types:-

- (a) Mild steel of Grade 1 tested quality conforming to IS: 432-Part-\_\_
- (b) 3370 Code of practice for concrete structures for (Part I to IV) the storage of liquids
- (c) High yield strength cold worked deformed steel bars of tested quality conforming to IS: 1786 or hot rolled high tensile deformed steel bars of tested quality conforming to IS: 1139.
- (d) Hard drawn steel fabric conforming to IS: 1566.
- (e) Where galvanized reinforcement is specified in the drawings, the bars or mesh shall be hot-dip galvanized after bending generally in accordance with IS: 2629 and IS: 4759. Galvanized reinforcement shall be coated with a layer of zinc no where less than 0.05 mm in thickness.

All reinforcement shall be stored horizontally above ground level on supports, skids or other approved supports, clear of any running or standing water. Contact with soil should be avoided. Proper drainage and protection from the elements shall be provided to minimize corrosion.

Before steel reinforcement is placed in position, the surface of the reinforcement shall be cleaned of rust, dust, grease and other objectionable substances. In order to confirm the quality periodical tests as specified as the relevant IS shall be conducted by the contractor at his own cost.

#### **4.3.2. BINDING WIRE**

Binding wire shall be black annealed steel wire conforming to IS: 280 and of minimum 18 gauge.

#### **4.3.3. WELDING ELECTRODES**

Electrodes used for welding of steel bars shall be of ordinary mild steel grade electrodes conforming to IS: 814 and shall be of the best quality approved by Consultant/Project-in-charge.

#### **4.4 STORAGE**

Reinforcement steel shall be handled and stored in a manner that bending or distortion of the bars is avoided and contamination of steel is prevented.

All reinforcement shall be stored horizontally above ground level on supports, skids or other approved supports, clear of any running or standing water. Contact with soil should be avoided. Proper drainage and protection from the elements shall be provided to minimize corrosion. Bars of different classifications and diameters shall be stored separately. A record shall be kept of the batch numbers of reinforcement deliveries in such a form that the part of the works in which particular reinforcement is used can be readily identified. Welding electrodes shall be stored in moisture control-led environment in accordance with the manufacturer's recommendations.

#### **4.5 FABRICATION**

Reinforcement steel shall be carefully and accurately cut, bent or formed to the dimensions and configurations shown on the drawings and as per bar bending schedules approved by the Consultant / Project-in-charge. All reinforcement shall be bent cold using appropriate pin size. Bars may be preheated only on approval of the Consultant. Quenching shall not cool hot bars. Bends shall be in accordance with IS: 2502.

It shall be ensured that the bars are not straightened in any manner that will injure the material. Any bars incorrectly bent shall be used only if means for straightening and rebinding be such as not to affect adversely the material. Reinforcement shall not be re-bent or straightened without prior review by the Consultant. No reinforcement shall be placed in position on the works without approval of the Consultant, whether or not it is partially embedded in hardened concrete.

Reinforcement steel having a reduced section, visible transverse cracks in bends, or otherwise damaged in anyway shall not be used.



Spiral reinforcement shall be accurately fabricated to the diameter and pitch shown on the drawings. One and one half finishing turns shall be provided at both top and bottom unless shown otherwise. Cut ends of galvanized rods shall be given a protective coat of an approved zinc paint immediately after cutting.

#### **4.6 LAPPING**

As far as possible bars of maximum length available shall be used. All bars shall be in one length unless otherwise shown on the drawings or agreed with the Consultant/Project-in-charge.

Laps shown on the drawings or otherwise specified by the Consultant shall be based on the used of bars of maximum length by the contractor. In case the Contractor wishes to use shorter bars, laps shall be provided at the Contractor's cost in the manner and locations approved by the Consultant /Project-in-charge.

Not more than 1/3 rd of the bars or as specified in the drawings shall be lapped at one section. Reinforcement bars shall not be welded unless shown on the drawings or instructed by the Consultant / Project-in-charge.

#### **4.7 PLACEMENT**

All reinforcement shall be placed accurately and maintained in the position indicated on the drawings. The contractor shall provide approved type of supports for maintaining the bars in position and ensuring required spacing and correct cover of concrete to the reinforcement as called for in drawings. Pre-cast cement concrete blocks of required shapes and size, MS. chairs and spacers bars shall be used in order to ensure accurate positioning of reinforcement. Pre-cast concrete blocks shall be cast well in advance and shall be at least equal in quality to the class of concrete specified in the work.

In fair faces of concrete, temporary spacers only shall be used and removed or withdrawn as compaction of concrete proceeds. Spacers will not be permitted to be left in fair faces of concrete.

All intersections of the reinforcements shall be securely tied with two strands of binds wire twisted tight to make the skeleton or net work rigid so that the reinforcement is not displaced during placing of concrete. Tack welding of crossing bars shall not be done except as authorized or directed by the Consultant / Project-in-charge. Nothing extra will be paid for tack welding.

The contractor shall take all responsible precautions to ensure that when handling or erecting reinforcement no damage shall be done to finished concrete . Bars that are partially embedded in concrete shall not be filed bent unless concurrence has been obtained from the Consultant / Project-in-charge.

Walkways and borrow runs for placing and compacting the concrete shall be independent of the reinforcement.

Loose binding wire and other extraneous metal shall be removed from inside the form work prior to concrete placing.

Without relieving the Contractor of the responsibilities for the correctness thereof, the reinforcement shall be inspected and approved by the Consultant in writing before any concrete is placed and the contractor shall allow sufficient time for such inspecting and any subsequent remedial action to be carried out No part of the reinforcement shall be used for conducting electrical currents.

#### **4.8 COVER TO REINFORCEMENT**

Unless shown otherwise on the drawings, minimum cover for all reinforcement shall be provided as per IS: 456 care shall be taken to maintain the correct cover to reinforcement.

For concrete members exposed to weather, earth, action of harmful chemicals, acid vapor, saline atmosphere, sulphurous smoke etc minimum cover for reinforcement shall be increased by 15 mm to 40 mm as directed by the Consultant / Project-in-charge.

The maximum cover for reinforcement shall not be greater than that specified above or shown on the drawings plus 10 mm except for bundled bars.

For bundled bars, minimum, concrete cover shall be equal to the equivalent diameter of the bundle but need not be greater than 50 mm.

Exposed reinforcement intended for binding with future extensions shall be protected from corrosion as shown in the drawings.

#### **4.9 CLEANING**

After placing, the reinforcement shall be maintained in a clean condition until the concrete is placed. On no account the bars shall be oiled or painted or mould oil used on the formwork be allowed to come in contact with the bars.

Before concreting is commenced, the bars shall be thoroughly cleaned with dry gunny bags if they are coated lightly with rust or other impurities.

#### **4.10 WORK WILL INCLUDE**

- a) All cutting to lengths, labour in bending and cranking, forming hook ends, handling, hoisting and all that is necessary to fix reinforcement in work as per Drawings and specifications This shall also include all that is fairly intended and is necessary for completion of work.
- b) Cost of pre-cast concrete cover blocks to maintain cover and holding reinforcement in position, chairs, spaces, dowels, pins, laps, etc.
- c) For fabricating and fixing reinforcement in any structural member irrespective of its location, dimension and level.
- d) Work at all levels.
- e) All the above mentioned works shall be included in the quoted rates Nothing extra shall be payable to the contractor on this account
- f) Reinforcement Steel procurement shall be done by the Contractor.

### **5 SPECIFICATIONS FOR FORMWORK**

#### **5. 1GENERAL**

#### **5. 1.1DESCRIPTION**

This section covers the requirements for providing, fabricating and erecting of form work including propping, bracing, shoring, strutting, rising, bolting, wedging and all other temporary and all other temporary supports to the concrete during the process of setting subsequent removal of forms.

**5.1.2 RELATED WORK SPECIFIED ELSEWHERE**

- a. Cast-in-place Reinforced Concrete

**5.1.3 APPLICABLE CODES AND STANDARDS**

The codes and standards generally applicable to the work of this section are listed hereinafter

IS: 456 Code of practice for plain and reinforced concrete.

IS: 4990 Ply wood for concrete shuttering work.

**5.2 SUBMITTALS**

**5.2.1 TYPE OF FORM WORK**

Prior to start of delivery of material for formwork, the contractor shall prepare samples of different types of formwork for about 10 sqm and obtain approval of the Consultant/Project-in-charge.

**5.2.2 DESIGN OF FORMS**

Before fabricating of forms, the contractor shall submit design calculations for proposed form work to Consultant/Project-in-charge for his approval. However, the approval of his responsibility for adequately constructing and maintaining the forms so that they will function properly.

**5.2.3 TIE BOLTS**

In case the contractor proposes to use tie bolts running through the concrete, the location and size of such tie bolts shall be submitted to the Consultant/Project-in-charge for his Approval.

**5.3 MATERIALS**

5.3.1 Formwork shall be timber, plywood, steel or any other material capable of resisting damage to the contact faces under normal conditions of erecting forms, fixing steel and placing concrete. The selection of materials suitable for formwork shall be made by the Contractor based on the maximum quality consistent with the specified finished and safety.

**5.3.2 TIMBER**

Timber used for formwork shall be easily workable with nails without splitting. It shall be stable and liable to warp when exposed to sun and rain or wetted during concreting.

**5.3.3 PLYWOOD**

Plywood used for formwork shall be 12 mm thick shuttering quality plywood complying with IS: 4990 and of make approved by the Consultant

**5.3.4 STEEL**

Steel form work shall be made of minimum 2 mm thick or more as required black sheets stiffened with angle iron frame made out of M S angles 40 mm X 6mm.

**5.4 DESIGN CRITERIA**

Formwork shall be designed for the loads and lateral pressures due to dead weight of concrete, superimposed live loads of workmen, materials and plants and for other loads as indicated on

the drawings. Forms shall be designed to have sufficient strength to carry on the hydrostatic head of concrete as a liquid without deflection tolerances exceeding the acceptable limits.

Where necessary to maintain the tolerances indicated on the drawings. The formwork shall be cambered to compensate for anticipated deflections due to the weight and pressure of the fresh concrete, and also due to any other construction loads. Unless otherwise shown or specified, the camber shall be provided as below:-

Types of member Compression Steel Camber  
 As % of tensile steel Co-efficient

Simple span	0%	0.066
Continuous	50%	0.037
Restrained span	0%	0.032

Camber in cms Where  $(K \times L \times 2.54)/D$   
 K = Camber coefficient  
 L = Length of member in meter  
 D = Depth of member in meter

## **5.5 ERECTION OF FORMWORK**

Forms shall be used wherever necessary to confine the concrete during vibration and to shape it to the required line. The formwork shall conform to shapes, lines, levels and dimensions of the concrete sections shown on the drawings.

Forms shall have sufficient strength to withstand the pressure resulting from placement and vibration of concrete and shall be maintained rigidly in position. Form work shall be adequately supported by adequate number and size of struts, braces, ties and props to ensure rigidity of forms during concreting. Where props rest on natural or filled up ground, to avoid any settlement, the soil shall be thoroughly compacted and bases of props shall be sufficient size so as to restrict the bearing on the ground to 50 t/ sqm Forms shall be tight enough to prevent loss of mortar from the concrete and to produce dense, homogenous and uniformly coloured concrete completely free from honeycombing or surface roughness. Joints in formwork shall be designed to prevent leakage, not only between individual elements forming the panels but also from the horizontal and vertical junction between the panels themselves.

If form work is held together by bolts or wires, those shall be so fixed that no reinforcement bar is exposed on surface against which concrete is to be laid. The Consultant may at his discretion allow the contractor to use tie bolts running through the concrete at his own cost.

Hole left in the concrete by these tie-bolts shall be filled as specified by him at the Contractor's expense. Formwork shall be constructed so as to facilitate loosening and permit removal without jarring the concrete. Wedges, clamps and bolts shall be used wherever practicable instead of nails. All formwork erected shall be approved by the Consultant/Project-in-charge before concreting is started.

## **5.6 CLEANING AND OILING OF FORMS**

At the time concrete is placed in the forms, the surface of the forms in contact with the concrete shall be free from encrustations of mortar, grout or other foreign materials. Temporary openings shall be left at the bottom of formwork to enable, sawdust, shavings, wire cuttings and other foreign material to be worked out from the interior of the forms before the concrete is placed.

The surface of the forms to be in contact with the concrete shall be coated with an approved coating that will effectively prevent sticking and will not stain the concrete surfaces. After each use the surfaces of forms in contact with concrete shall be cleaned, well settled and treated with form oil approved by the Consultant Project-in-charge. Lubricating (machine) oils shall not be used.

Oiling shall be done before reinforcement has been placed and care shall be taken that no oil comes in contact with the reinforcement while it is being placed in positions.

Immediately before concreting is commenced the formworks shall be carefully examined to see that all dirt, shavings, sawdust and other refuse have been removed and the formwork shall be wetted thoroughly to prevent absorption of water from concrete. The formwork shall be kept wet during concreting and for the whole time that it is left in place.

#### **5.7 REMOVAL OF FORM WORK**

Form works shall be removed carefully so as to prevent damage too the concrete. Wooden wedge only shall be used between the concrete surface and the form where force is necessary to separate the form from the concrete. Metal wedge, bars or tools shall not be used for this purpose. Any concrete damaged in the process of removing the forms shall be repaired in accordance with the provision of concrete specifications.

Unless otherwise permitted by the Consultant, the forms shall not be stripped in less than the minimum periods specified in IS: 456. However the Consultant may increase the above period if he considers it necessary for structural stability

All non-supporting forms shall be loosened and removed during regular working hours, and as soon as the concrete has hardened sufficiently to prevent damage from the removal of the forms All false work and forms supporting concrete beam and slabs, or other members subject to direct bending stress, shall not be removed or released until the concrete has attained sufficient strength to ensure structural stability and to carry both the dead and live loads including any construction loads which may be placed upon it.

No construction loads exceeding the combination of superimposed dead load plus specified live load shall be supported on any unshared portion of the structure under construction, unless analysis indicates adequate strength to support such additional loads Form work shall be removed in such a manner so as not to impair safety and serviceability of the structure It shall be removed gradually to prevent sudden application of loads to the concrete All concrete to be exposed shall have sufficient strength to prevent any damage caused by removal of formwork.

##### **5.7.1. HACKING:**

Immediately after removal of forms, the concrete surface intended to be either plastered or finished, shall be roughened with brush hammer or with chisel and hammer as directed by the construction manager to make the surface sufficiently coarse and rough to provide a bonding key for plaster.

No extra payments shall be made to the Contractor for such work on concrete surface after removal of the form work.

No payment shall be made for temporary formwork used in concreting, or for form work required for joints or bulk-heads, in floor or elsewhere, whether such joints are to be covered later with concrete or mastic or other materials.

##### **5.7.2. POCKETS AND OPENINGS:**

Where boxes, pockets or openings are required (not exceeding 0.1 sqm) to be formed in the concrete. No deduction shall be made for the area of box or pockets in measuring the area of concrete surface shuttered. In other words the area of shuttering shall be reckoned as if box of pocket or openings were not present.

However, on measuring the concrete quantity, the volume of the box or pocket shall be deducted. If the area of box or pocket or openings against the shuttered faces exceeds 0.1 sqm. It shall be paid not as a box or pocket or opening but as formwork at the rates for formwork.

No extra payment shall be made for holes to be made in the form work for inserting electrical conduits hooks for fans etc.

## **5.8 REUSE OF FORMS**

Immediately after the forms are removed, they shall be cleaned with jet of water and a soft brush before they are reused.

The contractor shall not be permitted reuse of any forms which in the opinion of the Consultant has worn out and has become unfit for formwork.

The Consultant/Project-in-charge may in his absolute discretion, order rejection of any forms he considers unfit for use in the works, and order their removal from the site.

## **6 SPECIFICATIONS FOR BRICK MASONRY WORK:-**

### **6.1 SCOPE:-**

The Contractor shall provide all labour, materials, scaffolding operations, equipment and incidentals necessary required for the completion of all brickwork called for in the drawings and documents and that which is fairly intended for smooth completion of the work.

### **6.1.1 BRICKS (CLASS 50):-**

The bricks shall be well burnt locally available from good brick earth and shall be of uniform size (9½x4.5½x3½) unless otherwise specified They shall be of uniform deep red, cherry or copper colour, thoroughly well burnt without being verified and regular in shapes.

### **6.1.3 MORTARS:-**

All brick work shall laid with specified mortar of good workable consistency.

### **6.1.4 SOAKING OF BRICKS:-**

All bricks required for masonry in cement or composite lime mortars shall be thoroughly soaked in clean water for at least one hour in advance of sufficient quantity size for immediate use. The cessation of bubbles when the bricks are immersed in water is an indication of thorough soaking of bricks.

### **6.1.5 LAYING:-**

- a) Bricks shall be laid in English bond, unless otherwise specified. Half or cut bricks shall not be used except where necessary to complete the bond. Closers in such cases shall be cut to the required size and used near the ends of the walls.
- b) The walls shall be taken up truly plumb. All courses shall be laid truly horizontal and all vertical joints join shall be truly vertical. Vertical joints in alternate courses shall come directly one over the other. The thickness of brick courses shall be kept uniform and for this purpose straight edge with graduations showing the thickness of each brick course including joint shall be used. Bricks shall be laid with frogs upwards.
- c) The walls of a structure shall be carried up regularly and nearly at one level and no portion of the work shall be left more than 3 ft. below the rest of the work. Where this is not possible the work shall be raked back according to bond (and not left toothed) at an angle not exceeding 45°.
- d) All iron fixtures pipes, outlets of water, holdfasts of doors and windows, etc., which are required to be built in walls, shall be embedded in cement mortar or in cement concrete as specified, in their correct positions as the work proceeds. Nothing extra shall be paid for such extra cement mortar or of the nature stated above.

**6.1.6. JOINTS:-**

Bricks shall be so laid that all joints are quite full of mortar. The thickness of the bed joints shall in no case exceed 3/8", unless otherwise specified. The face of joints shall be raked to a minimum depth of 0.5" by raking tool daily during the progress of work when the mortar is still green, so as to provide proper key for the plaster or pointing to be done. Where plastering or pointing is not required to be done, the joints shall be struck flush and finished at the time of laying. The face of brick work shall be cleaned daily and all mortar droppings removed

**6.1.7 BRICK-IN-EDGE COPING**

The top course of all plinths, parapets, steps and tops of walls below R.C.C. slabs or beams shall be laid with brick on edge, unless otherwise specified. Proper care shall be taken that the bricks forming the top corners and ends of walls shall be properly radiate and keyed in to position.

**6.1.8. CURING:-**

Green Work shall be protected from rain by suitable covering. Brick Masonry with cement or composite mortar shall be kept constantly moist on all faces for a minimum period of 7 (Seven) days. In case of fat lime mortar, curing shall commence two days after the laying of masonry and shall continue for 7 (seven) days

**6.1.9 SCAFFOLDING:**

Double scaffolding having two sets of vertical supports shall be provided. The supports shall be sound and strong. Tied together with horizontal pieces over which the scaffolding planks shall be fixed. In building up to two stories, single scaffolding shall be allowed. In this case, the inner end of the horizontal scaffolding pole shall rest in a hole provided in the header course only. Only one header or each pole shall be left out. The holds left in masonry work for supporting the scaffolding shall be filled and made good, before plastering. The Contractor shall be responsible for providing and maintaining sufficiently strong scaffolding so as to withstand all loads likely to come upon it.

**6.2 HALF BRICK AND THREE INCH THICK MASONRY:-**

6.2.1. The work shall be done exactly similar to the specification 'BRICK WORK' except that all courses shall be laid with stretchers.

6.2.2 Cement Mortar 1:4 (1 cement: 4 sand) shall be used unless otherwise specified in the description of the item.

6.2.3 The description of the item shall mention whether or not, reinforcement is to be provided, when the brick work is to be reinforced, hoop iron band 1" x 1/16" (2.5 c.m. x 1.6 mm) shall be embedded in the cement mortar at every fourth course or as described in the description of the item. The hoop iron shall be hooked (given a double lap) with minimum of 9" hooks at all angles and junctions. At either end of the wall, 2" (5 c.m.) lengths of the hoops shall be bent up or down so as to take a firm grip of the brick work. When hoop iron is not available, the Consultant may allow equivalent reinforcement in the form of mild steel.

**6.3 RUBBLE MASONRY:-**

**N.A.**

**7. SPECIFICATION FOR DOORS & WINDOWS :**

**7. 1 MATERIAL**

**7. 1.1 TIMBER**

#### **7.1.1.1 TEAK WOOD**

Teakwood shall be second class Indian Teakwood conforming to IS: 4021 of good quality, well seasoned and free from defects such as cracks, dead knots, sapwood etc. No individual and sound knot shall be more than 15 sq.cm in size and the aggregate area of such knots shall not exceed 2% of the areas of the piece. The timber shall be fairly close grained having not less than 2 growth rings per cm. Width in cross – section.

#### **7.1.1.2 Hard Wood:**

Hard wood shall be first class conforming to IS 4021 of good quality, well seasoned and free from defects such as dead knots, cracks, sapwood etc. No individual hard and sound knot shall exceed 6 sq.cm in size with no dimension more than 50 mm and the aggregate area of such knots shall not be more than 1% of the area of the piece. There shall not be less than 5 growth rings per cm. Width in cross-section.

#### **7.1.1.3.1 Moisture content in timber**

The maximum permissible percentage of moisture content for well seasoned timber shall be as per IS 287.

#### **7.1.1.4 Workmanship of wood work**

Workmanship for wood and joinery shall be as per IS 1200 and IS 4021.

#### **7.1.1.5 Painting / Polishing of wood work**

Painting / polishing of wood work shall be in accordance with clause Nos. of specification No.6.9.2 to 6.11.3.

### **7.2 WOODEN DOOR / WINDOW FRAME**

Wooden door / window frame shall be made of specified wood as per item description and shall be in accordance with detailed drawings.

The wooden members of the frame shall be planed smooth and accurate to the full dimensions. Rebats, rounding, moulding etc., shall be done before the members are jointed into frames.

Joints in the frame work shall be perfect with square edges and shall be pinned with hard wood / bamboo pins of 10 to 15 mm dia.

Wood work shall be painted / polished or otherwise treated as specified. All exposed portions shall be coated with wood primer and concealed surface by bituminous paints as per clause No. 6

Before any surface treatment is applied, the wood work shall be got approved by the Project-in-charge. The frames shall be fixed only after acceptance by the Project-in-charge. The frames shall be fixed to the masonry by 300 mm x 25 mm x 6mm MS hold fasts embedded in M-15 grade concrete block of 350 mm x 100mm x 100 mm in the hole of the masonry. In case of concrete, frames shall be fixed by 96mm long 12 mm dia metallic dash fasteners.

### **7.3 SHUTTERS:**

7.3.1. Particle Board flush shutter:

Particle board flush shutter shall in general conform to IS: 2202

#### **7.3.1.1 Materials**

##### **7.3.1.1.1 Particle Board**



Particle board shall conform to IS 3097 and shall be three layer flat pressed teak wood based and of exterior grade (Grade –1), type – 1, BWP type, bonded with phenol Formaldehyde synthetic resin conforming to IS: 848.

**7.3.1.1.2 Veneers**

Veneers shall conform to class – 1 of IS 303 and (BS 476 Part – 7)

**7.3.1.1.3 Teak wood**

Specification of Teak wood shall same as specified in clause 9.1.1.1

**7.3.1.1.4 Hinges**

Hinges shall be of brass and butt type conforming to IS: 205. Size of hinges shall be in accordance with shutter width and as per IS: 205.

**7.3.1.2.1 Workmanship**

The particle board of required size and thickness shall be lipped on all the edges with T-type, teak wood lipping. The overall board lipping composition shall be uniform and specified thickness and shall be properly sized in view of the operation of shutter.

All the four edges of the door shutter shall be square. The shutter shall be free from twist or warp in its plane. In case of double leaf shutters, the meeting of the stiles shall be rebated by one third the thickness of shutter. The rebating shall be splayed.

The shutter then shall be veneered on both faces by gluing approved shade and textured commercial type 0.5 mm thick veneering conforming to class 1 of IS 303. The veneering shall be done by gluing the veneer with BWP type, phenol formaldehyde synthetic resin conforming to IS 848 by not press process on the shutter. Workmanship and finish of the veneering shall conform to IS 303. The exposed surfaces of the lipping of the edges, shall be french polished in accordance with clause No. 6.9.2.4.2 of specification No.6. The shutter shall be fixed to the door frame, by means of hinges @ minimum 3 hinges per leaf, maximum spacing of hinges being 600 mm or as per drawing with suitable sized screws.

The shutter when fitted to the frame shall satisfy all operational aspects of the door like smooth movement, proper closing against the door frame etc.

**7.3.2 Glazed Wooden Door shutter**

**7.3.2.1 Materials**

**7.3.2.1.1 Wood**

Teakwood for various members like stiles, rails etc., shall be as specified in clause No.9.1.1.1.

**7.3.2.1.1 GLAZING**

Glass sheets for glazing shall be

- i. 4 mm thick plain glass (wt. 7.2 kg/m<sup>2</sup>) conforming IS : 2835, or
- ii. 5.5 mm thick wired glass conforming to IS: 5437 or
- iii. 6.3 mm thick laminated glass conforming to IS: 2553 as case may be as per item description or
- iv. 5.5 mm thick toughened glass.

Glass sheets shall be free from flaws, scratches, cracks, bubbles etc.

**7.3.2.1.3 WORKMANSHIP**

Teakwood stiles and rails of size as specified in item description shall be cut accurately and planned smoothly to required dimensions as per drawings. The stiles and rails shall be provided

with rebates for fixing the glazing and shall be jointed together to form the profile of the shutter as per drawings. The joinery work shall be as approved by Project-in-charge. Only after such approval, the joints shall be coated with white lead, pressed and secured by hardwood pins of about 6 mm dia. All the four edges of the shutter shall be square. In case of double leaf doors, rebates shall be provided at the meeting of stiles. Rebates shall be splayed type and one third the thickness of the stiles.

The glass sheets for glazing shall be fixed by teak wood beading having mitered joints as per drawings and shall be fixed by means of approved neoprene based adhesive and nailing, the spacing between the nails being no more than 300 mm.

All wooden surfaces shall be coated with 2 coats of approved make polyurethane with strainer mixed to achieve desired shade.

The shutter shall be fixed to the door frame, by means of hinge @ minimum 3 hinges per leaf, maximum spacing of hinges being 600 mm or as per drawing with suitable sized screws.

The shutter when fitted to the frame shall satisfy all operational aspects of the door like smooth movement, proper closing against the door frame etc.

#### **7.4 Aluminium Glazed Doors / Windows / Ventilators**

##### **7.4.1 General**

Aluminium glazed doors / windows / ventilators shall be of specified sectional size, dimension and profile as per drawings.

##### **7.4.2 Materials**

All Aluminium sections shall be extruded sections of Jindal/Hindalco aluminium alloy as per IS:733 and IS:1285. Aluminium sections shall be anodized as per IS: 7088 to min, 25 microns. Glass used for glazing shall be of following type in accordance with item description.

- i. 5.5 mm thick wired glass conforming to IS 5437.
- ii. 6.3 mm thick laminated safety glass conforming to IS 2553.
- iii. 5.5 mm thick transparent sheet glass conforming to IS: 2853 (Wt. 7.2 kg/sq.m).

##### **7.4.3 Workmanship**

Frames shall be square and flat, the corner of the frame being fabricated to true right angles. Details of construction of frames, shutters etc., shall be as per drawings.

Side hung window shutters shall either be fixed to the frame with pivots, or aluminium alloy hinges. For fixing the hinges, slots shall be cut in the fixed frames and the hinges inserted inside may be riveted to the frame. The hinges shall normally be of the projecting type conforming to IS designation A-5-M of IS –617, IS 733. In which case peg stay of 300 mm long complete with locking bracket and conforming to IS codes same as for hinges shall be provided. Friction hinges may also be provided in which case peg stays are not required.

The handles for side hung shutters shall be of cast aluminium conforming to IS designation A-5-M of IS 617 and shall be mounted on a handle plate riveted to the opening frames. The handle shall have anodized finish with minimum anodic film thickness of 25 micron of Electro colour finish. The handle shall have a two point nose which shall engage with an aluminium striking plate on the fixed frame. The striking plate shall be finished in the same manner as for the handle.

In case of top hung shutters, aluminium alloy cast hinges and peg stays (same as per side hung shutters) shall be provided.

Center hung shutters shall be hung on the two pairs of cup pivots of aluminium alloy of IS designation NS – 4 of IS 737 and IS designation A-5-M of IS 617 or chromium / cadmium

plated brass / bronze cup pivots riveted to the outer and inner frames to permit to swing through an angle of 85°. Cast aluminium (conforming to IS designation A-5-M of IS 617) or chromium / cadmium plated bronze spring catches shall be fitted in the centre of the top bar of the shutter. The spring catch shall be secured to the frame by screwing / riveting to the frame and shall close into and aluminium catch plate riveted / welded to the outside of the outer shutter frame bar. Aluminium or cadmium plated brass chord pulley wheel in an aluminium bracket shall be fitted at the sill of the shutter with Aluminium or galvanized / cadmium plated steel screws.

The door shutters shall be fitted with pivots as specified. The handle for doors shall be of aluminium and as per design. The door shutters shall be provided with locking device, floor spring, O/H door closer and any other hardwares, specified in item.

In case of composite Door / window / ventilator units shall be coupled as per drawing. Weather bar shall be provided whenever a coupling member is fitted over an external opening shutter. Glazing shall be fixed to the extruded sections by means of extruded aluminium beading. Glass panes shall be provided with rubber lining before fixing.

The aluminium frames shall be fixed to the masonry by means of aluminium lugs fixed to the frame (by counter sunk galvanized machine screws) and grouted with M-15 grade concrete in the hole in the masonry as per drawing. In case of concrete wall, the frames shall be fixed by 96 mm long, 12 mm dia metallic dash fasteners. Any steel material coming in contact with aluminium shall be galvanized. The windows / ventilators / doors shall be checked to ensure smooth operation, perfect level and plumb.

## **8. SPECIFICATION FOR FLOORING & PAVING**

### **8.1 SCOPE**

The Contractor shall furnish all labour, materials, tools, equipment, machinery operations and related items necessary and required for the full performance of the contract under this section, as shown on the drawings or as specified or reasonably implied or incidental to the construction.

### **8.2 GENERAL**

The flooring shall be laid to the level except where slopes are called for on the drawings, in which case the slopes shall be uniform and arranged to drain into the indicated outlets. Particular care shall be exercised to ensure that all flooring, skirting etc., is perfectly matched for color and finish. The Contractor shall pave the areas indicated on the plans and schedule of finishes with materials therein called for. All work shall be laid to the best practice known to the trade.

The Contractor shall furnish for approval by the Consultant, samples of each type of floor, paving etc., the samples shall be of sizes and thickness as specified.

### **8.3 POLISHED GRANITE STONE SLABS FOR FLOORING, STEPS, STAIRS, CLADDING ON PANTRY AND WASH BASIN COUNTERS**

Providing & fixing granite of approved quality and colour of required size mm double polished M/C cut of 20mm thick over floor surface in proper line. Level in CM 1:4 including finishing the joint with matching colour cement, polishing the top surface etc., complete as per instruction of EIC/ Consultant.

Granite stone shall be of best quality machine polished, Machine Cut and of approved colour, dense and homogenous in texture free from cracks, decay, weathering and flaws. The stone shall be of required size and shall be 20 mm thick. The material shall have to be approved by Consultant before and after procurement. Before laying flooring, the surface shall be paved and thoroughly hacked, cleaned off all mortar scales, loose materials etc., unless and until the surface is approved by Consultant / Engineer-in-charge, the laying shall not be done. The bedding with CM 1:4 proportion as directed by Consultant / Project-in-charge with minimum thickness of 30 mm layer shall be laid evenly and to the required slope. The granite shall be

truly and evenly set in thin paste of next cement apply to the bottom and to the prepared base. The stone then shall be temped down with wooden mallet until they are exactly in true plane and in line with adjacent stone.

The stone shall be closed jointed and filled with matching cement. The entire surface of flooring shall be polished with machine upto to mirror polish achieved including necessary use of antimony trioxide anilix acid etc., as directed by Consultant / Project-in-charge.

#### **8.4.1 FINISHING**

The finishing of the surface shall follow immediately after the cessation of beating. The surface shall be left for sometime, till moisture gets dried from its joints or top, Excessive trowel ling shall be avoided. Use of dry cement or cement and sand mixture sprinkled on the surface to stiffen the concrete or absorb excessive moisture, shall not be permitted.

#### **8.4.2 CURING**

The curing shall be done for a minimum period of ten days. Curing shall not be commenced until the top layer has hardened. Covering with empty cement gunnies shall be avoided as the color is likely to be bleached with the remanents of cement matter from the bags.

### **9 CERAMIC TILES GLAZED AND MATT FINISH**

Ceramic tiles in toilets and other areas where called for shall be non-slip ceramic tiles of approved make and shade. The tiles shall be laid to the pattern as approved by the Consultant. The tiles shall be of uniform color, true to size and shape and free from cracks, twists, uneven edges, crazing and other defects. The size and thickness of the tiles shall be as specified.

The tiles shall be laid as per the pattern shown in the drawings over a bed of specified thickness of cement mortar leveled to a true surface. The surface of the bedding mortar shall be left rough to provide bond for the tiles. A floating coat of thick cement slurry shall be laid over the screed to proper levels and the tiles set over the same firmly to correct line and levels.

The joints shall be filled and finished neat with cement paste pigmented to the shade of the tile.

The joints shall be finished neat as directed and shall be straight, regular and uniform. On completion, the surface shall be washed with water, rubbed with fine saw dust and left clean.

The finished floor surface shall be true to required levels.

### **9.1 VTRIFIED TILES IN FLOORING AND SKIRTING**

#### **9.1.1. VITRIFIED TILES**

The tiles shall generally conform to latest IS standards shall be procured by the contractor. They shall be flat, true to shape and free from cracks, crazing spots, chipped edges and corners. The glazing shall be of uniform shade and color shall be as shown in the drawings.

The tiles shall be of specified size and thickness as per drawing. The tolerance on facial dimension value shall be +/- 1.0mm and +/- 0.5 mm in thickness.

The top surface of the tiles shall be glazed. The glazed shall be either glossy or matt as specified. The underside of the tiles shall be completely free glazed in order that the tile may adhere properly to the base. Type edges of the tiles shall be preferably free form glaze, however, and glazed if unavoidable, shall be permissible on any one edge of the tile.

#### **9.1.2 LAYING**

The Vitrified tiles shall be laid over ferrow cement slab & it shall be cleaned, wetted Mortar of specified mix shall be spread to required thickness over a small area. The slab, washed clean, shall be laid on the mortar, pissed tapped, with a wooden mallet, and brought to required level. The tiles shall be laid as per the pattern shown on the drawings or as approved by Consultant / Project-in-charge.

It shall then be removed and laid a side. The top of the mortar shall then be corrected by adding fresh mortar at hollows. The mortar is then allowed to harden and cement slurry of paste like consistency shall be spread over the same at the rate of 1 bag per sq mt. area. The edges of the tile already laid shall be buttered with slurry of cement and pigment to match the shade of slabs. The tile to be laid shall then be placed back in position, pressed and properly bedded in level with adjoining tiles with as fine a joint as possible. Other tiles are also laid in similar manner to correct levels with fine joints. The surplus slurry on the surface shall be cleaned off. The tiles shall be soaked in water, washed clean, and a coat of cement slurry applied liberally at the back of tiles and set in the bedding mortar. The tiles shall be tamped and corrected to proper plans and lines.

The tiles shall be set in required pattern and butt jointed. The joints shall be as fine as possible. Where full size tiles cannot be fixed these shall be cut to the required size and their edges rubbed smooth.

### **9.1.3 CURING AND FINISHING**

The joints shall be cleaned off of the grey cement grout with soft wire brush or trowel to a depth of 2mm to 3mm and all dust and loose mortar removed. Joints shall then be flush pointed with white cement added with pigment if required to match the color of tiles. The surface shall then be kept wet for 7 days. After curing, the surface shall be washed and finished clean. The finished work shall not sound hollow when tapped with wooden mallet.

## **10 WATER-PROOFING FOR ROOF**

The waterproofing shall be integral cement based water proofing treatment including preparation of surface as required for treatment of roofs, balconies, terraces etc. consisting of following operations:

- a) Applying and grouting a slurry coat of neat cement using 2.75 kg/sqm. of cement admixed with proprietary water proofing compound conforming to IS : 2645 over the RCC slab including cleaning the surface before treatment.
- b) Laying cement concrete using broken bricks/brick bats 25mm to 100mm size with 50% of cement mortar 1:5 (1 cement: 5 coarse sand) admixed with proprietary water proofing compound conforming to IS: 2645 over 20mm thick layer of cement mortar of mix 1:5 (1 cement: 5 coarse sand) admixed with proprietary water proofing compound conforming to IS: 2645 to required slope and treating similarly the adjoining walls upto 300mm height including rounding of junctions of walls and slabs.
- c) After two days of proper curing applying a second coat of cement slurry admixed with proprietary water proofing compound conforming to IS: 2645.
- d) Finishing the surface with 20mm thick jointless cement mortar of mix 1:4 (1 cement: 4 coarse sand) admixed with proprietary water proofing compound conforming to IS: 2645 and finally finishing the surface with trowel with neat cement slurry and making of 300 x 300mm square.
- e) The whole terrace so finished shall be flooded with water for a minimum period of two weeks for curing and for final test. All above operations to be done in order and as directed and specified by the Project-in-charge.

With average thickness of 120mm & minimum thickness at khurra as 65mm.

### **10.1 GUARANTEE**

The treatment shall carry a guarantee for 10 years against leakage of water, dampness, seeping and other defects. The treated roof shall be tested by allowing water to stand on the areas to a depth of 150 mm for at least 72 hours. All guarantee shall be furnished in the format approved by the Consultant/Project-in-charge duly signed by the contractor and sub contractor.

## **10.2 SPECIFICATIONS FOR CURING**

**The finished surface shall be cured for at least 7 days 10.3**

### **KHURRAS**

The Khurras shall be constructed before the brick masonry work in parapet wall is taken up, and it shall be 5 cm x 45 cm and shall be formed of cement concrete 1:2:4 (1 cement : 2 coarse sand : 4 graded stone aggregate 20 mm nominal size) unless otherwise specified in the drawings.

## **10.4 LAYING**

A PVC sheet 1M X 1M X 400 micron shall be laid under the khurras and then cement concrete shall be laid over it to a minimum thickness of 3 cm with its top surface lower than the level of adjoining roof surface as approved.

## **10.5 FINISHING**

The khurras and sides of the outlet shall then be rendered with cement plaster of mix and thickness stipulated in the drawings. This shall be done when the concrete is still green and shall be finished with a floating coat of neat cement. The sides of the khurras and sizes of finished outlet opening shall be as directed by the Consultant.

## **11 SPECIFICATION FOR PLASTERING WORK**

### **11.1 SCOPE**

The Contractor shall furnish all labour, materials scaffolding, equipment, tools, plants and incidentals necessary and required for the completion of all plaster work.

### **11.2 GENERAL**

Plaster as herein specified shall be applied to all internal surface where called for. All plaster work shall be executed by skilled workmen in a workman like manner and shall be of the best workmanship and in strict accordance with the dimensions on drawings subject to the approval of the Consultant/Engineer-in-charge. The primary requirement of plaster work shall be to provide dense, smooth and hard enclosure and devoid of any cracks of the interior and/or exterior.

### **11.3 SCAFFOLDING**

Double scaffolding having two seats of vertical supports shall be provided. The supports shall be sound and strong, tied together with horizontal pieces over which scaffolding planks shall be fixed. The contractor shall get the scaffolding approved from the Consultant well in advance.

### **11.4 CHASING AND BREAKAGE**

Fixing of door and window frame, shall be completed before any plaster work is commenced on a surface. No chasing or cutting of plaster shall be permitted normally. However, if the same is felt unavoidable at places, written permission shall be obtained from the Consultant before cutting any such plaster. Broken corners shall be obtained from the Consultant before cutting any such plaster. Broken corners shall be cut back out less than 150 mm on sides and patched with cement mortar as directed. All corners shall be rounded to a radius of 80 mm or as directed by the Consultant.

### **11.5 PREPARATION**

Masonry and concrete surfaces which call for application of plaster shall be clean, free from dust and loose mortar. Efflorescence if any shall be removed by brushing and scrapping. For masonry surfaces the joints shall be raked out properly, while the concrete surfaces shall be roughed by wire brushing and hacking to provide the key, thereby ensuring proper bond to the satisfaction of the Consultant. The surface shall then be thoroughly washed with water, cleaned and kept wet before plastering is commenced.

## **11.6 CHICKEN WIRE MESH**

Galvanized chicken mesh (22 gauge, 12 mm size) shall be provided at junctions of brick masonry and concrete members, to be plastered and other locations as called for, properly stretched and nailed with galvanized wire nails, ensuring equal thickness of plaster on both sides of the mesh. The width of the mesh shall be as approved by the Consultant / Project-in-charge. The chicken mesh wherever. Specified, shall be fixed in place before plastering.

**11.7** Samples of each type of plaster shall be prepared well in advance of undertaking the work for the approval of the Consultant/Project-in-charge

## **11.8 MORTAR**

The mortar of the specified mix shall be used Mortar shall be prepared as specified underl Brick Workl. It shall be made in small quantities, as required, and applied within 15 minutes of adding water to the plaster mix

### **11.8.1 CEMENT:**

Cement shall be as per specifications under —Concrete Workl

### **11.8.2 WATER:**

Water shall be as per specifications under —Concrete Workl

### **11.8.3 SAND**

For plaster work normally clean fine river sand shall be used. However, if specified in the drawing or schedule of finishes, coarse sand conforming to the specifications under Concrete workl shall be mixed with fine river sand in proportion specified or directed by the Consultant.

### **11.8.4 WATER PROOFING COMPOUND**

FOSROC, ROFFE Chemicals or approved equivalent as approved by Consultant / Project-in-charge wherever specified.

## **11.9. CEILING PLASTER**

6mm thick Ceiling plaster shall be completed before commencement of wall plaster.

Plastering shall be started from the top and worked down towards the floor. To ensure even thickness and true surface, plaster about 15 x 15 cm shall be first applied, horizontally and vertically, at not more than 2 meters intervals over the entire surface to the plaster to serve as gauges. The surface of these gauged areas shall be truly in place of the finished plaster surface. The mortar shall be laid between the gauges with a trowel ensuring through filling of joints. The mortar shall be applied in a uniform surface slightly more than the specified thickness and then brought to a true surface, by working a wooden straight edge reaching across the gauge, with small upward and side movements at a time. Finally the surface shall be finished off true with trowel or wooden float according as a smooth or a sandy granular texture is required. Excessive trawling or over working the float shall be avoided.

All corners, arises angles and junctions shall be truly vertical or horizontal as the case may be and shall be carefully finished. Rounding or chamfering corners, arises, junctions etc. Where required shall be done without any extra payment. Such rounding shall be carried out with proper templates to the sizes required. No portion of the surface shall be left out initially to be patched up late on. Grooves shall be provided at the junction of ceiling and wall plaster without any extra cost.

In suspending work at the end of the day, plaster shall be left, cut clean to line both horizontally and vertically. When recommencing the plastering, the edge of the old work shall be scraped, cleaned and wetted with cement slurry before plaster is applied to the adjacent areas, to enable the two to be properly joined together. Plastering work shall be closed at the end of a day on the body of the surface and not nearer than 15 cm to any corners or arises. It shall not be closed on the body of the features such as pilasters, bands and cornices. Horizontal joints in plaster work shall not also occur on parapet tops and copings, as these invariably lead to leakages.

#### **11.9.1 GROOVES**

Wherever directed all joints between concrete and brick masonry besides other locations as called for shall be expressed by a groove cut in plaster at no extra cost

#### **11.9.2 FINISH**

The plaster shall be finished to a true and plumb surface and to the proper degree of smoothness as required. The work shall be tested frequently as the work proceeds with a true straight edge not less than 2.5 m long and with plumb bobs. All horizontal lines and surfaces shall be tested with a level and all jambs and corners with a plumb bob as the work proceeds.

#### **11.9.3 CURING**

Curing shall be started as soon as the plaster has hardened sufficiently not to be damaged when watered. The plaster shall be kept wet for a period of at least 7 days. During this period, it shall be suitably protected from all damages

#### **11.9.4 PRECAUTION**

Any cracks which appear in the surface and all portions, which sound hollow when tapped or are found to be soft or otherwise defective shall be cut out in rectangular shape and redone as directed by the Consultant

#### **11.9.5 FLOATING COAT OF NEAT CEMENT**

Where finishing with a floating coat of neat cement is specified in the drawings or directed by the Consultant, specification, for this item of work shall be same described above except for the additional floating coat which shall be carried out as below. When the plaster has been brought to a true surface with the wooden straight edge, it shall be uniformly treated over its entire area with a paste of neat cement and rubbed smooth, so that the whole surface is covered with neat cement coating. The quantity of cement applied for floating coat shall 1 kg. per sq. mt. smooth finishing shall be completed with trowel immediately and in no case later than half an hour of adding water to the plaster mix.

#### **11.10 BEARING PLASTER**

This shall consist of cement plaster 1:3 (1 cement : 3 coarse sand) 20 mm thick finished with a coat of neat cement laid on top of walls as bearing for RCC lintels, beams and slabs. When dry, a thick coat of lime wash shall be given.

### **12. SPECIFICATION FOR PAINTING WORK**

#### **12.1 OIL BOUND DISTEMPER**

##### **12.1.1 MATERIALS**

Oil emulsion (Oil Bound) washable distemper (IS : 428) of approved brand and manufacture shall be used. The primer shall be of the same manufacture as distemper shall be diluted with water of any other prescribed thinner in a manner recommended by the manufacturer. Only sufficient quantity of distemper required for day's work shall be prepared.



The distemper and primer shall be brought by the contractor in sealed tins in sufficient quantities at a time to suffice for a fortnight's work, and the same shall be kept in the joint custody of the contractor and the Project-in-charge. The empty tins shall not be removed from the site of work, till this item of work has been completed and passed by the Consultant / Project-in-charge.

#### **12.1.2 PREPARATION OF SURFACE**

The surface shall be thoroughly cleaned of dust. Any unevenness shall be made good by applying putty, made of plaster of Paris mixed with water on the entire surface including filling up the undulations and then sand papering the same after it is dry.

Pitting in plaster shall be made good with plaster of Paris mixed with the colour to be used. The surface shall then be rubbed down again with a fine grade sand paper and made smooth. A coat of the distemper shall be applied over the patches. The patched surface shall be allowed to dry thoroughly before the regular coat of distemper is applied

#### **12.1.3 APPLICATION**

15 cm double bristled distemper brushes shall be used. After each day's work, brushes shall be thoroughly washed in hot water with soap solution and hung down to dry. Old brushes which are dirty and caked with distemper shall not be used on the work.

#### **12.1.4 SCAFFOLDING**

The specifications in respect of scaffolding, protective measures shall be as described under white washing.

### **12.2 WATER PROOF CEMENT PAINT**

#### **12.2.1 MATERIAL**

Cement paint of required colour and of approved brand and manufacture conforming to IS : 5410 shall be used. Before application of the cement paint the shade shall be got approved from the Consultant. Cement paint shall be mixed with water in two stages. The first stage shall comprise of 2 parts of cement paint and one part of water stirred thoroughly and allowed to stand for 5 minutes. Care shall comprise of adding further one part of water to mix and stirring thoroughly to obtain a liquid of workable and uniform consistency. In all cases the manufacturer's instructions shall be followed meticulously.

Cement paint shall be mixed in such quantities as can be used up within a hour of its mixing as otherwise the mixture will set and thicken, affecting flow and finish.

The lids of cement paint shall be kept tightly closed when not in use, as by exposure to atmosphere the cement paint rapidly become air set due to its hygroscopic qualities.

#### **12.2.2 PREPARATION OF SURFACE**

For new work, the surface shall thoroughly be cleaned of all mortar dropping, dirt, dust, algae, grease and other foreign matter by brushing and washing. The surface shall be thoroughly wetted with clean water before the cement paint is applied.

#### **12.2.3 APPLICATION**

For new work, the treatment shall consist of a priming coat of cement paint following by the application of two or more coats of cement paint till the surface shows an even colour. For each coat, the entire surface shall be coated with the mixture, uniformly, with proper cement paint brushes in horizontal strokes followed immediately by vertical ones which together shall constitute one coat.

The subsequent coats shall be applied only after the previous coat has dried. The finished surface shall be even and uniform and shall show no brush marks.

Enough cement paint shall be mixed to finish one room at a time. The application of a coat in each room shall be finished in one operation and no work shall be started in any room, which cannot be completed the same day. After each day's work, the brushes shall be washed in hot water and hung down to dry. Old brushes which are dirty or caked with painting shall not be used.

#### **12.2.4 SCAFFOLDING**

The specifications in respect to 12.1.1 scaffolding protective measures shall be as described above under white washing.

### **13. SPECIFICATIONS FOR ACRYLIC EMULSION PAINTING:**

#### **13.1 Workmanship:**

##### **13.1.1 Scaffolding:**

Wherever scaffolding is necessary, it shall be erected on double supports tied together by horizontal pieces, over which scaffolding planks will be fixed. No ballies, bamboos or planks shall rest on or touch the surface which is being white washed. Where ladders are used, pieces of old gunny bags shall be tied on their tops to avoid damage or scratches to walls.

##### **13.1.2 Preparation of surface:**

Preparation of surface shall in general be in accordance with, except that any unevenness shall be made good by applying putty (white cement based) mixed with water including up the undulation and then sand papering the same after it is dry.

##### **13.1.3 Preparation of paint**

The paint mix, shall be continuously stirred while applying for maintaining uniform consistency. Number of coats shall be as per item description. The painting shall be laid evenly and smoothly by means of crossing and laying off. The crossing and laying off consists of covering the area with paint, brushing the surface and at first, then brushing alternatively in opposite direction 2/3 times and then finally brushing lightly in a direction at right angles to the same. In this process, no brush marks, no hair marks, no clogging of paint puddles shall be permitted. The full process of crossing and laying off will constitute one coat.

The paint shall be applied by means of brush or roller.

Before starting painting with plastic emulsion paint, the prepared surface shall be treated with two coats of primer consisting of cement primer whitening and plastic emulsion paint shall start only after the preceding coat has become sufficiently hard to resist brush marking. Subsequent coats of plastic emulsion paint shall also be started after the preceding coat is dried by evaporation of water content.

The surface of finishing shall present a flat, velvet smooth finish, even and uniform shade without patches, marks, paint drops etc.

##### **13.1.4 Precautions:**

- i. Brushes shall be quickly washed in water immediately after use and kept immersed in water during break periods to prevent the paint from hardening on the brush. Old brushes, if used shall be completely dried of turpentine / oil paints by washing in warm soap water.
- ii. No oil base putty shall be used in filling cracks / holes.
- iii. Washing of painted surface shall not be done within 3-4 weeks of application.

### **13.1.5 Protective measures**

Surface of distempering over existing distempered surface, the existing distempering shall be scrapped by steel scrapers leaving a clean surface.

All nails shall be removed. Pitting in plaster shall be made good with plaster of paris mixed with dry distemper of colour to be used. The surface then shall be rubbed down again with a fine grade sand paper and made smooth. A coat of distemper shall be applied over the patches. The surface shall be allowed to dry thoroughly before the regular coat of distemper is allowed.

The surface affected by moss, fungus, algae efflorescence shall be treated in accordance with IS 2395.

## **13.2 ACRYLIC COPOLYMER AGGREGATE FINISH**

### **13.2.1 Material**

It shall be an acrylic based textured wall coating consisting of quartz and silica aggregate, inorganic pigments and other additives to form a crack free, flexible, tough, water proof coating.

### **13.2.2 Preparation of Surface**

The surface to be coated shall be cleaned and all dirt, dust, grease and loose particles shall be removed. Any old textures surface shall be removed with removing agent as per manufacturer's instructions.

### **13.2.3 Application**

Bonding agent and water shall be mixed first. Then the flakes / granules shall be added and mixed thoroughly and kneaded till no lumps are found. The dough shall be left for 20-30 minutes before starting application. The bonding agent, flakes / granules and water shall be mixed in different ratios for different finishes as per manufacturer's specifications.

The first application shall be by steel trowel. It shall be smoothened, if the specified finish required, by a plastic trowel.

## **13.3 VARNISHING**

Varnishing of wood and wood based material shall be in accordance with IS 2338 (Part – II). Surface to be Varnished shall be prepared to produce a smooth, dry and matt surface and all dust and dirt shall be removed from the surface.

The varnish shall be applied liberally with a brush and spread evenly over a portion of the surface with short light strokes to avoid fronting. It shall be allowed to flow out while the next section is being laid in. Excess, varnish shall be scraped out of the brush and then the first section be crossed, re crossed and laid off lightly. The varnish, once it has begun to set, shall not be retouched. In case of any mistake, the Varnish shall be removed and the work shall be started afresh.

Where two coats of varnish are applied, the first coat shall be hard drying under coating or flattening varnish which shall be allowed to dry hard and then be flattened down before applying the finishing coat. Sufficient time shall be allowed in between two coats.

When flat varnishing is used for finishing, a preparatory coat of hard drying under coating or flattening varnish shall first be applied and shall be allowed to harden thoroughly. It shall then be lightly rubbed down before the flat varnish is applied.

On larger areas, the flat varnish shall be applied rapidly, and the edges of each patch applied shall not be allowed to set, but shall be followed up whilst in free working conditions.

#### **13.3.1 French polish**

French polish shall conform to IS: 348. Suitable pigments shall be added to get the required colour. The surface to be French polished shall be rubbed down to smoothness with sand paper and shall be well dusted. Pores in the surface shall be filled up with fillers. A pad of woolen cloth covered by a fine cloth shall be used to apply the finish. The pad shall be moistened with polish and rubbed hard on the surface in a series of over lapping circles applying the polish sparingly but uniformly over the entire area to give an even surface. A trace of linseed oil may be used on the face of the pad for the purpose. The surface shall be allowed to dry and the remaining coats applied in the same way. To finish off, the pad shall be covered with a fresh piece of clean fine cloth, slightly dampened with methylated spirit and rubbed lightly and quickly with circular motions. The finished surface shall have a uniform texture and high gloss.

### **13.4 PAINTING OF STEEL AND OTHER METAL SURFACES**

#### **13.4.1 GENERAL**

Reference shall be made to the following Indian Standards: IS 2524, IS 1447.

#### **13.4.2 Preparation of surface**

The surface, before painting, shall be cleaned of all rust, scale, dirt and other foreign matter with wire brushes, steel wool, scrappers, sand paper etc. The surface shall then be wiped finally with mineral turpentine which shall then be removed of grease etc. The surface then shall be allowed to dry. In case of GI surface so prepared shall be treated with Mordant solution (5 liters for about 100 sq.m) by rubbing the solution generously with brush. After about half an hour, the surface if required shall be retouched and washed down thoroughly with clean cold water & allowed to dry.

#### **13.4.3 Application of priming and paints**

Approved quality primer and paint in specified no. of coats shall be applied as per manufacturer's recommendations either by brushing or spraying. Each subsequent coat shall be applied only after the preceding coat is dried.

### **13.5 SYNTHETIC ENAMEL PAINT TO WOOD WORK**

13.5.1 Synthetic enamel paint of approved brand and manufacture and of the required colour shall be used for the top coat and an under coat of shade to match the top coat as recommended by the manufacture shall be used.

13.5.2 One coat of specified paint of shade suited to the shade of the top coat shall be applied after rubbing with the finest grade of wet abrasive paper to ensure a smooth and even surface, free from brush marks and all loose particles dust off.

13.5.3 Top coats of specified paint of required shade shall be applied after the first coat is thoroughly dry. Additional finishing coats shall be applied if found necessary to ensure properly uniform glossy surface.

## **14. SPECIFICATION FOR FALSE CEILING**

### **1. FALSE CEILING GRID SYSTEMS**

#### **1.1.1 ALUMINIUM GRID SYSTEM**

Aluminium grid system for supporting false ceiling tiles shall be of approved make and shall be perfectly levelled aligned at desired height and in accordance with the false ceiling pattern as per drawings.

**1.1.2.1 MATERIAL**

a. Main Runner shall be of extruded anodized (25 micron) aluminium Tee sections of 25mm x 35mm size (approved make), 2.5 mm thick.

**1.1.1.2 ERECTION**

The grid system shall be assembled by interlocking the main and cross runners @ 600 mm c/c max. on bothways by means of aluminium angle cleats. The main runners shall be suspended from the ceiling by means of 3 mm thick MS flat clamp fixed to main runners @ 1200 mm max. and fixed to 6 mm dia MS hook which again is fixed to the ceiling. 3 mm thick MS flat clamp shall be connected to main runner with 25 mm long MS clamp with leveling nut and @ 1200

mm maximum. The MS hooks shall be suspended from the ceiling by means of slotting in 25mm x 3mm thick MS flat, 'L' shaped, fixed to the slab by 12 mm dia Dash fasteners @ 1200 mm C/C. The overall grid system shall be rigid, in accordance with false ceiling pattern, perfectly leveled and aligned at desirable height.

**1.1.2 GI GRID SYSTEM**

GI grid system for supporting false ceiling tiles shall be perfectly leveled, aligned at desired height in accordance with false ceiling pattern.

**1.1.3.1 MATERIAL AND WORKMANSHIP**

**a. Wall Channels**

Wall channels shall be made 0.5 mm thick GI of size 27 mm, one flange 20 mm and other 30 mm. Wall channels shall be fixed to peripheral walls by raw plugs / dash fasteners @ 450 mm C/C.

b. Intermediate Channels (main runners) GI intermediate channels shall be 0.9 mm thick, of size 45 mm and with two flanges of 15 mm each. The intermediate channels shall be suspended from the soft @ 1200 mm with 25 mm x 0.5 mm GI hanger bolted to the channel and fixed to the ceiling (by means of bolting to GI cleat fixed to the ceiling with dash fasteners).

**c. Ceiling Sections (Cross runners)**

GI channel shaped ceiling sections shall be 0.5 mm thick having a knurled Web of 51.1 mm and two flanges of 26 mm each with lips of 10.5 mm. The ceiling sections shall be fixed to the intermediate channels in perpendicular direction at 450 mm C/C with the help of connecting clips.

**1.2 GYPSUM BOARD TILES:**

Gypsum board shall conform to IS: 2095

The Gypsum boards used for false ceiling shall have following properties.

i Thermal Conductivity – 0.16 W / mk

ii Thermal Resistance

a. For 9.5 mm thick board – 0.06 m<sup>2</sup> K/W

b. For 12.5 mm thick board – 0.08 m<sup>2</sup> K/W

c. For 15 mm thick board – 0.09 m<sup>2</sup> K/W

iii Fire Propagation a. Fire Propagation

Index of performance not exceeding 12 and a sub index not exceeding 6 (when each side is tested separately to BS 476 Part – 6).

- b. Surface spread of flame Class 1 (both sides) as / test to BS 476 Part – 7).

Gypsum boards shall be of specified thickness, and of specified finish (painted / prelaminated). The Gypsum boards shall be screw fixed to the under side of false ceiling grid system with 12.5 mm dry wall screw @ 230 mm C/C by drilling machine. Joint in the board shall be finished flush with fillers, finisher and primer as per manufacturer's recommendation to give a seamless finish.

Necessary cut-outs for Electrical / AC and other fixtures shall be provided with a framing of wall channels. In case of fixing on modular grid system, the boards shall be cut to required size and fixed in the same manner as in clause 11.2.1.

The finished false ceiling shall be perfectly leveled and aligned, at desired height as per drawings.

#### **15. LIST OF APPROVED MAKES/AGENCY OF MATERIALS (FOR**

**CIVIL WORK**) The following guidelines are to be noted with regard to use of

materials in the work.

1. The CONTRACTOR shall be required to use material of the make given in the list of approved make or specifically mentioned in the schedule of rates . EMPLOYER is free to demand the CONTRACTOR to use any particular make from the approved list of items.

However in case of non availability of any item as per the list of approved make CONTRACTOR shall use alternative item of ISI make with prior written permission from the CONSULTANT/Project-in-charge.

2. Wherever, material bearing Standard Mark (ISI) are used in the work, the Contractor should furnish necessary documents and proof of payments made for the procurement of materials bearing Standard Mark (ISI).

3. In case it is established that Standard material (bearing ISI mark) as well as the materials indicated in the list (as mentioned in the above para) are not available in the market, then approved equivalent materials may be used in the work subject to approval from the consultant and Project-in-charge.

4. For materials bearing "Standard Mark (ISI)" ordinarily no testing is to be done. However, in case of doubt or with a view to check the quality of materials, Project-in-charge may send samples for random testing.

5. For use of materials other than materials bearing "Standard Mark (ISI)" Mandatory tests shall be conducted at the frequency specified in the contract. In case frequency of testing is not stipulated in the contract then standard specification (CPWD, ISI etc.) may be considered for frequency at which materials are to be tested.

6. Before bulk purchase of quantities of materials, it is the responsibility of the Contractor to get the samples of materials approved from consultant and Project-in-charge.

<b>Sl. No.</b>	<b>MATERIALS</b>	<b>APPROVED MAKE/ APPROVED AGENCY</b>
1.	Antitermite emulsifiable concentrate	As per CPWD specifications and ISI marked
2.	Damp proof materials / water proofing compound.	Impermo, Duraseals, Acco-proof, CICO etc., Duraseed, STP, GE Silicon, Pidilite. Fosroc
3.	Reinforcement steel	Tata, SAIL, Vizag Steel, RHL, Jindal

**CIPET/LUCK/E-TEN-12 DISMANTLING AND RE-CONSTRUCTION/2019-20**

4.	Structural steel section	Tata, SAIL, Vizag Steel, RHL, Jindal
5.	Ordinary portland cement 53	Ambuja, Vikram , Shree , JK , J.P, ACC
6.	White cement	JK white, Birla white
7.	Aluminum glazing section	Hindalco, Jindal
8.	Al. Glazing fabrication	As approved by CIPET/Consultant
9.	Anodised aluminum hard ware fittings	Everite , Sigma, Opel, NU-LITE, Jyothi
10.	Locks	Godrej, Harrison
11.	Door closers	Dorma
12.	Float glass	Asahi float, Modi float, Hindustan Glass Company,
13.	Wire mesh	Sterling Enterprises, Trimurty welded mesh
14.	Distemper	J&N. Berger, Shalimar, Asian, Nerolac
15.	Synthetic enamel paint	J & N, Berger, Shalimar, Asian, Nerolac, ICI
16.	Plastic emulsion paint	Asian , Berger , Nerolac, ICI, J&N, Shalimar
17.	Water proof cement paint	Snowcem, Asian, Nerolac, Berger
18.	Glazed ceramic tiles	Johnson, Somany, Kajaria, Spartek
19.	Unglazed ceramic tiles	Bell, Kajaria, Somany, Johnson.
20.	Ceramic border tiles 3l wide	Johnson, Somany, Kajaria, Spartek
21.	Cement concrete tiles	Eurocon, Pavit, Duracrete
22.	Vitrified granamite tiles	Johnson, Bell Granito, Navin Ceramics, NITCO Somany, Kajaria
23.	Floor spring for Alu. Door & Door closer	Dorma
24.	Bitumen	Indian oil, Hindustan petroleum, Bharat Petroleum
25.	Chemical Impregnated Water Proofing / Brickcoba Water Proofing Agencies	Overseas Water Proofing Co., Hindustan water Proofing, Indian Water Proofing, National Water Proofing,
26.	Flush doors	Anchor, , Kitply, Goyal Industrial Corporation, Woodcraft, Jain Wood Industries, Greenlam, Century,
27.	Laminates	Decolam, Greenlam, Formica, National,
28.	Mirror	Modi, Saint Gobain, Atul
29.	Copolymer Acrylic aggregate Paints	Heritage or equivalent
30.	Wooden flooring	NOVO floor, COSMO floor, PERGO floor
31.	Electronic automatic door	Dorma or equivalent

**16. LIST OF DOCUMENTS/REGISTERS TO BE MAINTAINED AT SITE FOR ENSURING PROPER QUALITY CONTROL OF WORK IN PROGRESS**

1. A complete set of Contract Documents.
2. A complete set of drawings (Tender drawings and Good for Execution Drawings).
3. A complete set of change in specification or scope if any.
4. Material Test Register (Master Register) indicating details of various other Test Registers.
5. Cement Test Register.
6. Aggregates Test Register
  - i) Fine aggregate-sand
  - ii) Coarse aggregate
7. Cube Test Register
8. Register for anti-termite material used in the work.
9. Register for bricks testing. .
10. Bar bending schedule Register/Pour Cards.
11. Concrete Pouring Register.
12. Paint Test Register.
13. Register for approval of samples for various materials.
14. Site Order Book.
15. Register showing use of non specified materials and reasons thereof.
16. Hindrance Register
17. Cement & steel consumption register.
18. Levels-Record registers (for earth filling, roadwork).
19. Daily records pertaining to labour deployment.
20. Records for all the deviations during the execution of work to be maintained.
21. Records for bitumen consumption register.
22. Paint consumption register.
23. Water proofing compound consumption register. 24.Measurement Book.



VOLUME III OF V

TECHNICAL SPECIFICATIONS

FOR

ELECTRICAL WORKS

**SPECIFICATIONS FOR ELECTRICAL WORKS**

**GENERAL & COMMERCIAL**

**1. COMPLETENESS OF TENDER :-**

All sundry fittings, assemblies, accessories, hardware items, foundation bolts, termination lugs for electrical connections as required, and all other sundry items which are useful and necessary for proper assembly and efficient working of the various components of the work shall be deemed to have been included in the tender, whether such items are specifically mentioned in the tender documents or not.

**2. RATES :-**

The rates tendered shall be for complete items of work inclusive of Cost of material, erection, connection, testing, labour, supervision, tool & plants, storage, contingencies, breakage, wastage, execution at any level & height , all taxes (including works contract tax, if any), duties, and levies etc. and all charges for items contingent to the work, such as, packing, forwarding, insurance, freight and delivery at site for the materials to be supplied by the contractor.

**3.WORKS TO BE DONE BY THE CONTRACTOR :-**

The scope of internal and external electrification under this contract shall include the supply of all material, labour, T&P, erection, testing and commissioning of followings –

- Main Switches, Main Panels, meter board and external cable connection.
- Sub and branch distribution boards, MCB's and RCCB's etc.
- Mains and Sub mains between various panels, meter boards and distribution boards.
- Point wiring with Conduits for all type of wiring including circuits, sub mains, light, fans, power and AC etc.
- Switches and socket outlets for light, fans, plug, power, Tel, TV, computer network etc with suitable MS/GI boxes with accessories complete.
- Earthing and Lightning Protection with earth leads/strips.
- Conduits and wiring for Telephone, EPABX, TV system, PA system, Music system and Computer networking, fire alarm, broad band etc.
- Under ground and above ground Cables and other allied works.
- Provision of emergency electrical supply and distribution for complete light, fans and other specified points is also included in the scope of work. For the purpose of emergency distribution separate DB's shall be installed for Light/fans and Power/AC at every place, so that these can be separated. Similarly arrangement for change over etc is also to be made in the panels.
- Lighting Fixtures fans and exhaust fans. (If these are supplied by the client, then the contractor will erect the fixture as required without any extra payment beyond the contract)

All the above work shall be complete in all respects up to the satisfaction of architect, consultant, Client and Engineer in charge.

Unless and otherwise mentioned in the tender documents the following works shall be done by the contractor, and therefore their cost shall be deemed to be included in their tendered cost:

- i. Foundations for equipment and components where required, including foundation bolts.
- ii. Cutting and making good all damages caused during installation and restoring the same to their original finish.
- iii. Sealing of all floor openings provided by him for pipes and cables, from fire safety point of view, after laying of the same.
- iv. Painting at site of all exposed metal surfaces of the installation other than pre-painted items like fittings, fans, switch gear/distribution gear items, cubical switchboard etc. Damages to finished surfaces of these items while handling and erection, shall however be rectified to the satisfaction of the Engineer-in-charge.
- v. Temporary shed if required over the storage space and locking arrangement thereof, and watch and ward of the materials and completed installation till completion of the work.
- vi. Water and power as may be required for installation and testing.
- vii. Testing and commissioning of completed installation.

**4.ELECTRIC POWER SUPPLY AND WATER SUPPLY :-**

Unless and otherwise specified, power supply and water supply as may be required shall be arranged by the contractor for installation and testing of the equipment's at the site of work.

**5.TOOLS FOR HANDLING AND ERECTION :-**

All tools and tackles required for handling of equipment and materials at site of work as well as for their assembly and erection and also necessary test instruments shall be the responsibility of the contractor.

**6.CO-ORDINATION WITH OTHER AGENCY :-**

The contractor shall co-ordinate with all other agencies involved in the building work so that the building work is not hampered due to delay in his work. Recessed conduit and other works which directly affect the progress of building work should be given priority.

**7.CARE OF BUILDINGS :-**

Care shall be taken by the contractor to avoid damage to the building during execution of his part of the work. He shall be responsible for repairing all damages and restoring the same to their original finish at his cost. He shall also remove at his cost all unwanted and waste materials arising out of his work from the site, from time to time as designed by the Engineer-in-charge.

**8.STRUCTURAL ALTERATIONS TO BUILDINGS :-**

- i. No structural member in the building shall be damaged/altered, without prior approval from the competent authority through the Engineer-in-charge.
- ii. Structural provisions like openings, cutouts if any, provided by the department for the work, shall be used. Where these require modifications, or where fresh provisions are required to be made, such contingent works shall be carried out by the contractor at his cost.
- iii. All such openings in floors provided by the department shall be closed by the contractor after installing the cables/conduits/rising mains etc. as the case may be, by any suitable means as approved by the Engineer-in-charge without any extra payment.

- iv. All chase required in connection with the electrical works shall be provided and filled by the contractor at his own cost to the original architectural finish of the buildings.

**9. WORK IN OCCUPIED BUILDINGS :-**

- i. When work is executed in occupied buildings, there should be minimum of inconvenience to the occupants. The work shall be programmed in consultation with the Engineer-in-charge and the occupying department. If so required, the work may have to be done even before and after working hours.
- ii. The contractor shall be responsible to abide by the regulations or restrictions set in regard to entry into, and movement within the premises.
- iii. The contractor shall not tamper with any of the existing installations including their switching operations or connections there to without specific approval from the Engineer-in-charge.

**10. STATUTORY REGULATION AND APPROVALS :-**

All electrical works shall be carried out only by those Contractors who are licensed by the concerned local authorities to execute this type of work. Only —All Class government approved electrical contractor shall execute the job.

It shall be the responsibility of the Contractor to comply with the regulations laid down by the Indian Electricity Rules and local authorities. The Contractor shall also be responsible for obtaining all the statutory approvals/certificates for the work from the concerned Departments and these certificates shall be handed over to the Architects/Clients at the completion. All coordination with the local electric supply authorities, submitted of application, getting the desired load sanctioned shall be in the scope of contractor. The fees required to obtain the desired load sanctioned and other legal and miscellaneous charges by local electric supply authority / undertaking shall be given by the client but all follow ups etc. shall be the contractor's responsibility.

On completion of the work, the contractor shall obtain the certificates of final inspection and approval by the local electric supply authority and deliver these certificates to the Owner/Architects in original. The contractor shall bear all expenses and fees required to obtain these certificates without which the work shall not be taken over and shall not be considered complete..

**11. STANDARDS AND CODE OF PRACTICE :-**

The work shall be carried out as per the enclosed Specifications of work and the construction drawings to be issued from time to time. These specifications shall be read in conjunction with National Building Code, National Electrical Code 1985, Relevant Codes of Practices and Standards as issued by ISI and Indian Electricity Rules, CPWD specifications for electrical works (all with the latest amendments). The installation shall confirm in all respects to Indian Standard code of Practices. Following BIS codes shall be referred -

- a) National Electrical Code
- b) IS : 694 – 1977 : PVC insulated cables for working voltage up to and including 1100 volts
- c) IS : 732 -1989 : Electrical wiring installation
- d) IS : 1225 -1938 : Installation and Maintenance of power Cables up to and including 33 KV Rating
- e) IS : 1554 : PVC insulated heavy duty electrical cables.
- f) IS : 1860 : Installation operation and maintenance of passenger and goods elevator.
- g) IS : 2309 -1989 : Protection of building and allied structures against lightning.

- h) IS: 3043 -1987: Earthing
- i) IS: 3646 (Part-1) -1992: Interior Illumination
- j) IS: 3661 (Part-2) -1967: Current rating for cable
- k) IS: 3661 (Part-5) -1968: Current rating for cable
- l) IS: 5216 (Part-1) -1982: Recommendations on safety procedures and practices in electrical work.
- m) IS: 7098 (1 & 2) : XLPE insulated cables
- n) IS: 10118 (Part-1) -1982: Selection, Installation and Maintenance of switchgear and Control gear

**12. MATERIAL SAMPLES AND SHOP DRAWINGS :-**

It shall also be the responsibility of the Contractor to submit without any extra charge the samples of the materials/equipment as and when asked by the Architect/Consultant. If the Contractor wishes to use an alternative make due to non-availability of the approved one, he should take the prior approval of the Architect/Consultant. Under such situations the Contractor shall show such promptness as not to hamper the progress of the work.

The Contractor shall submit for Architect/Consultant's approval the shop drawings at approved scale indicating the custom built equipment, L.T. Panels, run of cables and conduits he proposes to install.

**13. ELECTRICAL DRAWINGS :-**

i) The electrical drawings issued from time to time to the contractor are diagrammatic but shall be following as closely as actual construction and work will permit. Any deviation from the drawings required to conform to the building construction shall be made by the Contractor at his own expenses. The architectural drawings shall take precedence over the electrical drawings as far as the civil and other trades works are concerned.

ii) If there is any discrepancy due to in-complete description, ambiguity or omission in the drawings and other documents relating to this Contract found by the Contractor either before starting the work or during execution or after completion, the same shall be immediately brought to the attention of the Architect/Consultant and his decision would be final and binding on the Contractor.

**14. TESTING AND COMMISSIONING :-**

The Contractor shall be responsible for testing and commissioning the entire electrical installation described in these specifications and relevant IS specifications and will demonstrate the operation of the systems to the entire satisfaction of the Architect/Consultant and to the Client approval.

**15. COMPLETION DRAWINGS**

The contractor shall submit, after the completion of the work, one set of originals and two sets of prints of the As-Fitted drawings/Completion drawings, giving the following information :

- a. Run and size of conduits, inspection, junction and pull boxes.

- b. Size of conductor in each circuit.

- c. Location and ratings of sockets and switches controlling the light/fan and power outlets.

- d. Location and details of distribution boards, mains, switches, switch gears and other particulars.

- e. A complete wiring diagram as installed and schematic drawings showing all connections in the complete electrical system.

- f. Location of telephone outlets, junction boxes and sizes of various conduits.

- g. Location of all earthing stations, route and size of all earthing conductors etc.

- h. Layout and particulars of all cables.

**GENERAL & TECHNICAL**

**1POINT WIRING :-**

**1.1. DEFINITION :-**

A point including socket outlet point shall include all work necessary in complete wiring to the following outlets from the controlling switch or MCB. The scope of wiring for a point shall include the circuit wiring from distribution board to the switch board and from switch board to the individual point. The wiring includes the phase, neutral and earth wire as required.

- i. Ceiling rose or connector (in the case of points for ceiling/exhaust fan points, pre wired light fittings and call bells).
- ii. Ceiling rose (in the case of pendants except stiff pendants)
- iii. Back plate (in the case of stiff pendants).

**1.2. SCOPE :-**

Following shall be deemed to included in point wiring.

- i. Conduit/casing and capping as the case may be, accessories for the same and wiring cables between the switch box and the point outlet.
- ii. All fixing accessories such as clips, nails, screws, Phil plug, rawl plug etc as required.
- iii. Metal switch boxes for control switches, regulators, sockets etc, recessed or surface type of modular type or piano type with sheet as required and as mentioned in BOQ.
- iv. Outlet boxes, junction boxes, pull-through boxes etc, but excluding metal boxes if any, provided with switchboards for loose wires/conduit terminations.
- v. Any special block required for neatly housing the connector.
- vi. Control switch or MCB, as specified.
- vii. 3 pin or 6 pin socket, ceiling rose or connector as required.
- viii. Connections to ceiling rose, connector, socket outlet, lamp holder, switch etc.
- ix. Interconnecting wiring between points on the same circuit, in the same switch box or from another.
- x. Protective (loop earthing) conductor from one metallic switch box to another in the distribution circuits, and for socket outlets.
- xi. Bushes conduit or porcelain tubing where wiring cables pass through wall etc.

**1.3 MATERIAL :-**

- i The system of wiring shall consist of ISI marked single core, PVC insulated, FR, 1100 volt grade, stranded, flexible copper conductor wires as per IS : 694 amended up to date.
- ii The Conduit and accessories shall be of mild steel of ISI marked (IS:9537) ERW black, stove enameled, screwed type. The wall thickness of conduits shall be 16 SWG for 20, 25 and 32 mm dia conduits and 14 SWG for 40 and 50 mm dia conduits.

**1.4. CONDUCTOR SIZE :-**

**Wiring shall be carried out with following sizes of wires**

- a. Light/fan/call bell/ exhaust fan point -1.5 sq mm.
- b. 5 amp plug points-1.5 sq mm.
- c. Light circuit-2.5 sq mm.
- d. General / Primary Power point-4.0 sq mm.
- e. Secondary Power point-2.5 sq mm.
- f. Power point for AC -6.0 sq mm.

**1.5 Size of Earth wires shall be as per following table - Size of point/ circuit / submain wires**

Earth wire	
2x1.5 sq.mm.-1.5 sq.mm.	
2x2.5 sq.mm.-1.5 sq.mm.	
2x4 sq.mm.-2.5 sq.mm.	
2x6 sq.mm.-4 sq.mm.	
2x10 sq.mm.-6 sq.mm.	
	2x16 sq.mm.-6 sq.mm.
	4x6 sq.mm.-2x4 sq.mm.
4x10 sq.mm.-2x6 sq.mm.	
4x16 sq.mm.-2x6 sq.mm.	

**2. MEASUREMENT :-**

**2.1. POINT WIRING :-**

i. Unless and otherwise specified, there shall be no linear measurement for point wiring for light points, fan points, exhaust fan points and call bell points. These shall be measured on unit basis by counting.

ii. No separate measurement will be made for interconnections between points in the same distribution circuit and for the circuit protective (loop earthing) conductors between metallic switch boxes.

**2.3 GROUP CONTROL POINTS WIRING :-**

i. In the case of points with more than one point controlled by the same switch, such point shall be measured in parts i.e. (a) from the switch to the first point outlet as one point (Primary point), and (b) for the subsequent points each shall be treated as separate point (additional/secondary).

ii. No recovery shall be made for non-provision of more than one switch in such cases.

**2.4 TWIN CONTROL LIGHT POINT WIRING :-**

i. A light point controlled by two numbers of two way switches shall be measured as one point.

**2.5 MULTIPLE CONTROLLED CALL BELL POINTS WIRING :-**

i. In the case of call bell points with a single call bell outlet, controlled from more than one place, the point shall be measured in parts i.e. (a) from the call bell outlet to one of the nearest ceiling roses meant for connection to bell push, treated as one point and (b) from that ceiling rose to the next one and so on, shall be treated as separate point(s).

ii. No recovery shall be made for non-provision of more than one ceiling rose or connector for connection to call bell in such cases.

**3. CIRCUIT AND SUBMAIN WIRING :-**

**3.1. CIRCUIT WIRING :-**

Circuit wiring shall mean the wiring from the distribution board up to the switch board(s). (This is included in the point wiring)

**3.2. SUB MAIN WIRING :-**

Sub main wiring shall mean the wiring from one main/distribution switchboard to another .

**4. MEASUREMENT OF SUBMAIN WIRING :-**

i. Sub main wiring shall be measured on linear basis along the run of the wiring. The measurement shall include all length from end to end of conduit or casing and capping as the case may be, exclusive of interconnections inside the switch board etc.

**5. SYSTEM OF DISTRIBUTION AND WIRINGS :-**

i. Main distribution board shall be controlled by the circuit breaker. Each outgoing circuit shall be controlled by a circuit breaker on the phase or live conductor.

- ii. The branch distribution board shall be controlled by a circuit breaker. Each outgoing circuit shall be provided with a MCB of specified rating on the phase or live conductor.
- iii. The load of the circuits shall be divided, as far as possible, evenly between the number of ways of the distribution boards, leaving at least one spare circuit for future extension.
- iv. The neutral conductors (incoming and outgoing) shall be connected to a common link (multi way connector) in the distribution board and be capable of being disconnected individually for testing purposes.
- v. Wiring shall be separate for essential loads (ie those fed through stand by supply) and non-essential loads throughout.

**6. BALANCING OF CIRCUITS :-**

The balancing of circuits in three wire or poly phase installations shall be arranged up to the satisfaction of the Engineer-in-charge.

**7. WIRING SYSTEM :-**

- j. Unless and otherwise specified the wiring shall be done only by the —Looping systeml. Phase or live conductors shall be looped at the switch boxes and neutral conductors at the point outlets.
- ii. Lights, fans and call bells shall be wired in the ‘\_lighting’ circuits. 15A/16A socket outlets and other power outlets shall be wired in the ‘\_Power’ circuits. 5A/6A socket outlets shall also be wired in the —Lightingl circuit unless mentioned otherwise.
- iii. The wiring throughout the installation shall be such that there is no break in the neutral wire except in the form of a linked switch gear.
- iv. Surface wiring shall run, as far as possible, along the walls and ceiling so as to be easily accessible for inspection.
- v. In all types of wiring, due consideration shall be given for neatness, good appearance and safety.

**8. PASSING THROUGH WALLS OR FLOORS :-**

- i. When wiring cables are to pass through a wall, these shall be taken through a protection (steel/PVC) pipe or porcelain tube of suitable size such that they pass through in a straight line without twist or cross in them on either end of such holes. The ends of metallic pipe shall be neatly bushed with porcelain, PVC or other approved material.
- ii. Where a wall pipe passes outside a building so as to be exposed to weather, the outer end shall be bell mouthed and turned downwards and properly bushed on the open end.

**9. JOINTS IN WIRING :-**

- i. No bare conductor in phase and/or neutral or twisted joints in phase, neutral, and/or protective conductors in wiring shall be permitted.
- ii. There shall be no joints in the through-runs of cables. If the length of final circuit or sub main is more than the length of a standard coil, thus necessitating a through joint, such joints shall be made by means of approved mechanical connectors in suitable junction boxes.
- iii. Termination of multi stranded conductors shall be done using suitable crimping type thimbles.



**10. CONFORMITY TO I.E. ACT, I.E. RULES AND STANDARDS :-**

- i. All electrical works shall be carried out in accordance with the provisions of the Indian Electricity Act, 1910 and Indian Electricity Rules 1956 amended up to date.
- ii. The work shall also conform to relevant Indian Standard codes of practice for the type of work involved.
- iii. In all electrical installation works, relevant safety codes of practice shall be followed.
- iv. The complete wiring installation shall conform to IS : 732 amended up to date.

**11. GENERAL REQUIREMENTS OF COMPONENTS :-**

**11.1 QUALITY OF MATERIALS :-**

All materials and equipment supplied by the contractor shall be new. They shall be of such design, size and material as to satisfactorily function under the rated conditions of operation and to withstand the environmental conditions at site.

**11.2 RATING OF COMPONENTS :-**

- i. All components in a wiring installation shall be of appropriate ratings of voltage, current and frequency, as required at the respective sections of the electrical installation in which they are used.
- ii. All conductors, switches and accessories shall be of such size as to be capable of carrying the maximum current which will normally flow through them, without their respective ratings being exceeded.

**11.3 CONFORMITY OF STANDARDS :-**

All components shall conform to relevant Indian Standard specification, wherever existing. Materials with ISI certification mark shall be preferred. However for conduits, wiring cables, piano/tumbler switches and socket outlets, ISI marked materials shall only be permitted.

**11.4 INTERCHANGEABILITY :-**

Similar parts of all switches, lamp holders, distribution fuse boards, switch gears, ceiling roses, brackets, pendants, fans and all other fittings of the same type shall be interchangeable in each installation.

**SWITCHGEAR AND CONTROLGEAR**

**1. GENERAL ASPECTS :-**

- i. All items of switchgear and distribution boards (DB' s) shall be metal clad type.
- ii. The types, rating and/or categories of switch gear and protective gear shall be as specified in the tender schedule of work.
- iii. RCCB's, ELCB's and RCBO's where specified, shall conform to the requirements of current rating, fault rating, single phase or three phase configuration and sensitivity laid down in the tender documents.
- iv. While each outgoing way of distribution board (D.B.) shall be of miniature circuit breaker (MCB) as specified, and of suitable rating on the phase conductor, the corresponding earthed neutral conductor shall be connected to a common neutral terminal block and shall be capable of being disconnected individually for testing purpose.

**v. Independent earth terminal block.**

Every distribution board (single phase as well as three phase) shall have an earth terminal block identical to, but independent from neutral terminal block, to enable termination of protective (loop earthing) conductors (incoming as well as out goings) individually by screwed connection and without twisting.

- vi. Earthing terminal (1 for single phase and 2 for three phase) shall be provided on the metal cladding of switches and D.B.' s for body earthing. These shall be suitably marked.
- vii. Knock out holes, with or without end plates as per standard design of manufacturers, shall be provided in the metal cladding of switches and D.B.' s for termination of conduits/cables.
- viii. Each distribution board shall be provided with a circuit list giving details of each circuit which it controls and the current rating of the circuit, and the size of the fuse element.

**2. MCB TYPE DISTRIBUTION BOARDS (MCB DB) :-**

- i. MCB DB' s may be of single phase, three phase (horizontal type) suitable for feeding single phase loads or 3 phase (vertical type) suitable for feeding single phase as well as three phase loads, each phase isolation type three phase DB in which each phase can be isolated by a separate circuit breaker or RCCB, as specified. These shall be complete with accessories, but without MCB' s, which shall be specified as a separate item in the tender documents.
- ii. The current ratings and the number of ways shall be as specified. Blanking plates shall be provided to close unused ways. These shall be indicated as a separate item in the Schedule of work.
- iii. MCB DB' s shall be of surface/flush mounting pattern according to the requirement of their location, and shall be suitable to accommodate MCB' s and MCB type isolators and RCCB (ELCB) at incoming in single pole or multi pole configuration, as required.
- iv. MCB DB's shall be double door type, dust and vermin proof conforming to IP 42, and shall be fabricated out of CRCA sheet steel, 1.6 mm thick, with stove enameled paint finish.
- v. In case of Concealed / Recessed D.B.'s, cutting of brick work, providing suitable lintel, making good the wall including plastering etc. with necessary civil work including all Civil material shall be included in contractor's scope for proper completion of work.

- vi. MCB DB' s shall have removal type end plates with knock-outs at the bottom and top, and shall have hinged covers with locking arrangement.
- vii. Only the knobs of the MCB' s shall protrude out of the front covers through openings neatly machine made for the purpose.
- viii. The bus bars used shall be solid electrolytic copper of appropriate sections.
- ix. Din bar(s) shall be provided for mounting the MCB' s.
- x. The complete board shall be factory fabricated and shall be duly pre-wired in the works, ready for installation at site.
- xi. The board shall be fully pre wired with single core PVC insulated copper conductors/insulated solid copper links, and terminated on to extended type terminal connectors, suitable for connections to the sizes of the respective conductors.
- xii. All incoming and outgoing wiring to the pre wired MCBDB' s shall be terminated only in the extended terminal connectors to be provided within the DB. The terminal connectors shall therefore be so provided as to facilitate easy cable connections and subsequent maintenance.

**3. MCCB TYPE DISTRIBUTION BOARDS (MCCB DB) :-**

- i. All MCCB DB' s shall be of three phase suitable for feeding single phase loads or 3 phase loads through SP/TP MCB's, IP 42 enclosure, sheet steel, double door with tinned copper bus bar, neutral bar, earth bar, knock outs etc. The DB's shall be original factory fabricated of approved make.
- ii. The current ratings of Incomer MCCB shall be either 125 or 250 amp and the number of ways shall be as specified. Blanking plates shall be provided to close unused ways.
- iii. MCCB DB shall be of surface/flush mounting pattern according to the requirement of their location, and shall be suitable to accommodate Four pole MCCB at incomer and SP/TP MCB's at outgoings, as required.
- v. MCCB DB's shall be dust and vermin proof conforming to IP 42, and shall be fabricated out of CRCA sheet steel, 1.6 mm thick, with stove enameled paint finish.
- v. In case of Concealed / Recessed D.B.'s, cutting of brick work, providing suitable lintel, making good the wall including plastering etc. with necessary civil work including all Civil material shall be included in contractor's scope for proper completion of work.
- vi. MCCB DB' s shall have removal type end plates with knock-outs at the bottom and top, and shall have hinged covers with locking arrangement.
- viii. The bus bars used shall be solid electrolytic copper of appropriate sections.
- ix. Din bar(s) shall be provided for mounting the MCB' s.

**4.A. MINIATURE CIRCUIT BREAKERS (MCB) :-**

- i. All MCB' s shall be ISI marked as per IS : 8828-1998.
- ii. Ratings, numbers of poles, type of MCB shall be as specified in the tender documents.
- iii. The breaking capacity of MCB' s shall be 10 KA.

**B. MOULDED CASE CIRCUIT BREAKER (MCCB's)**

The Moulded Case Circuit Breaker shall be magneto-thermal type or Static trip electronic release type (as specified in BOQ) for 100 Amp frame rating and current limiting type with Static trip electronic release for above 100 Amp frame rating for accurate overload and short circuit protection.

MCCB's of over 100 Amp rating shall be provided with field adjustable setting plug for accurate adjustment of continuous current. 100 Amp MCCB shall be provided with factory adjusted settings as required.

The minimum Breaking capacities of M.C.C.B.'s shall be as follows:

100 / 125 Amp : 25 KA

160/200/250 Amp : 35 KA

300/400/630/800 Amp : 50 KA

**5. WORKMANSHIP :-**

i. Good workmanship is an essential requirement to be complied with. The entire work of manufacture/fabrication, assembly and installation shall conform to sound engineering practice.

ii. The work shall be carried out under the direct supervision of a first class licensed foreman, or of a person holding a certificate of competency issued by the state Government for the type of work involved, employed by the contractor, who shall rectify then and there the defects pointed out by the Engineer-in-charge during the progress of work.

**6. COMMISSIONING ON COMPLETION :-**

Before the workman leaves the work finally, he must make sure that the installation is in commission, after due testing.

**7. COMPLETION PLAN AND COMPLETION CERTIFICATE :-**

i. For all works completion certificate after completion of work shall be submitted to the Engineer-in-charge.

ii. Completion plan drawn to a suitable scale in tracing cloth with ink indicating the following, along with three blue print copies of the same shall also be submitted.

a) General layout of the building.

b) Locations of main switch board and distribution boards, indicating the circuit numbers controlled by them.

c) Position of all points and their controls.

d) Types of fittings, viz. fluorescent, pendants, brackets, bulkhead, fans and exhaust fans etc.

e) Name of work, job number, accepted tender reference, actual date of completion, names of Division/Sub-Division and name of the firm who executed the work with their signature.

**8. ADDITION TO AN INSTALLATION :-**

An addition, temporary or permanent, shall not be made to the authorised load of an existing installation until it has been definitely ascertained that the current carrying capacity and the condition of the existing accessories, conductors, switches etc affected, including those of the supply Authorities, are adequate for the increased load.

**LIST OF APPROVED MAKES OF MATERIAL**

The following is the list of products and the names of the approved manufacturers against each product. However approved equivalent materials of any other specialized firms may be used in case it is established that the brands specified below are not available in the market and subject to approval of alternate brand by the Owner/Architects.

1.	Moulded case Circuit Breaker	:	L&T/Crompton/English Electric.
2.	Switchfuse Units	:	L&T/Siemens/English Electric.
3.	MCB	:	MDS/Indokopp/Indoasian
4.	Contactors	:	L&T/Siemens/Crompton/Telemechanique
5.	Panels	:	Factory fabricated as per approved design.
6.	HRC Fuses/ Fuse Carriers	:	L&T/Siemens
7.	Meters	:	AE/IMP/Rishabh
8.	Indicating lamps	:	Concord
9.	L.T. CTS	:	Kappa/AE
10.	Selector Switches	:	L&T,Kaycee,Salzer,MK,Philips, Havells
11.	LT/HT Cables	:	Skytone, Gloster, Finolex
12.	Cable Glands	:	Siemens type as per approval sample.
13.	Thimbles	:	Dowells
14.	MCB, DBs, RCCBs	:	Indo Asian /MDS/Schneider Electric.
15.	Plate switches/sockets	:	Crabtree , MK Electric
16.	Connectors	:	Indian Engg. Co.
17.	M.S. Conduit Pipe	:	BEC/AKG.
18.	P.V.C. Conduit Pipe	:	BEC/AKG/Kalinga
19.	P.V.C. Copper Wires	:	Skytone/ National/
20.	Telephone Cables:	:	Skytone/Kalinga
21.	Rising Main/ Plug in Box	:	English Electric/Zeta
22.	Industrial Type Sockets	:	Crompton/ Bhartia Cutle-Hammer
23.	Telephone Tag Block	:	‘Krone’
24.	Conduit Accessories	:	As per approved sample
25.	Fluorescent Light Fixtures	:	Philips/Bajaj or Equivalent
26.	Incandescent Light Fixtures	:	Philips/Bajaj or Equivalent
27.	Exhaust Fans	:	GEC, Crompton or Equivalent
28.	Ceiling Fans	:	Crompton, GEC or Equivalent
29.	Current Transformers	:	Automatic Electric, Kappa
30.	Panels	:	Jackson/KEPL/CMKL

Signature of Tenderer

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# DRAWINGS

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