To **E FORMAT**

THE PURCHASE / CONTRACT EXECUTING AGENCY / BHEL

ACCEPTANCE FOR ELECTRONIC FUND TRANSFER / RTGS TRANSFER

01	Name & Address of the Supplier / Sub-contractor	
02	VENDOR CODE assigned by BHEL	
	Details of Bank Account:	
03	NAME & ADDRESS OF THE BANK	
04	NAME OF THE BRANCH	
05	BRANCH CODE	
06	MICR CODE	
07	ACCOUNT NUMBER	
08	TYPE OF ACCOUNT	CURRENT A/C / OD / CASH CREDIT
09	BENEFICIERY'S NAME	
10	IFSC CODE OF THE BRANCH	
11	EMAIL ID	
12	TELEPHONE/MOBILE NO.	

CERTIFICATE

I / We hereby agree to receive the payments due from BHARAT HEAVY ELECTRICALS LIMITED by the National Electronic Funds Transfer and/or RTGS Transfer mode by credit to my / our above mentioned Bank Account. I / We also agree that payments made to the above mentioned Account are a valid discharge of the liability of Bharat Heavy Electricals Limited. I / We also agree to bear the applicable Bank Charges for the above mode of transfer. **A copy of the cheque leaf/cancelled cheque leaf of the above account is sent herewith.**

AUTHORISED SIGNATORY WITH NAME SEAL

Banker's Certification

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

PLACE: (Manager / Officer's)

DATE : Signature Under Bank stamp and Name Seal

With Membership No.

(Telephone / Mobile No.)

Forwarded to Accounts Dept.

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

Signature of the BHEL Executive with Name Seal (Operating the Contract/Services)

SIGNATURE OF THE APPLICANT

Bharat Heavy Electricals Limited

High Pressure Boiler Plant
Tiruchirappalli – 620 014. India
Civil Engineering Department (Township)

TENDER DOCUMENT (QUALIFICATION BID)

Name of work	:	**Design, fabrication, supply and erection of Pre Engineered steel Building including crane girder, roof & side cladding, accessories, sky light panels, roof/ turbo ventilator etc, for production Shop Floors of PPPU BHEL near Thirumayam in Pudukkottai (Dt) (Tamilnadu).**
Value of work	:	
Tender Notice No.	:	**Township 06 / 10**
Tender Schedule No.	:	**T 25 / 10**
Period of Contract	:	**9 Months**
Issued to	:	

BHARAT HEAVY ELECTRICALS LIMITED
TIRUCHIRAPPALLI – 620 014

CIVIL ENGINEERING DEPARTMENT (TOWNSHIP)

BHE: CP: TS No : 14,June , 2010

To

The Tenderer

Dear Sirs,

Sub: **Design, fabrication, supply and erection of Pre Engineered steel Building including crane girder, roof & side cladding, accessories, sky light panels, roof/ turbo ventilator etc, for production Shop Floors of PPPU - BHEL near Thirumayam in Pudukkottai (Dt) (Tamilnadu)**

Ref: 1. Tender Notice No. Township 06 / 10
2. Tender Schedule No. T 25 / 10

*****

Please find enclosed / attached non-transferable tender document containing
I) Qualification bid consisting, Preamble, Specifications, General Conditions of Contract, Norms for Qualification, Pro forma and Work & safety procedure ii) Price bid consisting of Preamble, Instruction to Tenderers, Bill of Quantities to offer your most competitive rates for all the items, drawings, Schedules A,B,C,D&E.

Tender for the work should be submitted in a sealed cover consisting of three inner sealed covers such as I) EMD cover ii) Qualification bid cover & iii) Price bid cover, all superscribing the name of work, tender schedule number, the contents etc.

1) **EMD cover shall contain requisite EMD in the form of DD.** Tenderers who had already remitted one time EMD should furnish the details of cash receipt No._____ dt. _____, on the top of EMD cover. Tender without EMD / without reference to one time EMD will be summarily rejected and the respective qualification bid shall not be opened.

   In case of tender documents downloaded from website, tender shall accompany the tender cost of Rs.750/- in the form of Demand Draft (separate) in addition to the EMD amount in the form of Demand Draft.

   All Demand Draft shall be drawn in favour of **BHEL, Trichy** payable at Tiruchirappalli.

2) Qualification bid cover shall contain duly filled in qualification bid document signed by the tenderer in all the pages with documentary evidences for pre-qualification such as experience, value of work executed in the similar nature of work, etc. Any bid without proper documentary evidence for pre-qualification shall not be considered for further evaluation.

3) The Price Bid cover shall contain price bid document duly filled in and signed by the tenderer in all the pages. **The tenderer has to quote most competitive rates for all the items in the Bill of Quantities from page No. 16 to 17 of Price Bid.**

The completed qualification bid and price bid along with requisite EMD of **Rs.2,00,000/**- for the work in the form of Demand Draft in favour of BHEL, Trichy shall reach the office of the undersigned on or before **14.07.2010 at 09.30 hrs.** EMD in any other form will not be accepted. The qualification bid will be opened on the **same day at 10.00 hrs.** In case of opening day falls on holiday or happened to be declared as a holiday, the receipt and opening of the tender shall automatically fall on the same timing of the next working day. Date and time of opening of the Price Bid shall be intimated only to the bidders those who have qualified after evaluation of the qualification bid. You / your authorized representative may participate in the tender opening.

Complete set of drawings as indicated in SCHEDULE D of Price Bid can be obtained from the undersigned on request and the same shall be signed and submitted along with the tender document.

Clarification if any, can be obtained contacting following phone No. 0431 – 2571428 / 2573718/ 2573708 Mobile: 9442631154. Fax No. : 0431 – 2520333.

Kindly acknowledge the receipt of the entire set of tender document.

Thanking you,

Yours faithfully
For and on behalf of
BHARAT HEAVY ELECTRICALS LIMITED,

DY.MANAGER / PLANNING
Civil Township

BHARAT HEAVY ELECTRICALS LIMITED
TIRUCHIRAPPALLI – 620 014

CIVIL ENGINEERING DEPARTMENT (TOWNSHIP)

PREAMBLE

1. The scope of work includes **Design, fabrication, supply and erection of Pre Engineered steel Building including crane girder, roof & side cladding, accessories, sky light panels, roof/ turbo ventilator etc, for production Shop Floors of PPPU - BHEL near Thirumayam in Pudukkottai (Dt) (Tamilnadu).**

2. Time is the essence of the contract. Being a time bound project with capital expenditure, the contractor should make all efforts to complete the work in time. Even though the overall completion period is indicated as **9 months**, the shop floor and other works shall be completed progressively and handed over bay wise as per agreed split up schedule.

3. The tenderers are advised to visit the plant area near Thirumayam in Pudukottai (Dt.) and get themselves acquainted with the site conditions before submitting the offer

4. **The following eligibility criteria shall be complied to fulfill the Qualification Bid :-**

    a) The tenderer should have EPF, PAN, Service Tax New Registration No., proof of having submitted IT return for the last three years, Profit & Loss account and balance sheet certified by the auditor.

    b) Average annual turnover in PEB in the last three years should be Rs. 40 crores

    c) During last three years should have successfully completed at least One Pre Engineered Building work not less Rs. 40 crores

    d) Latest Solvency (obtained within 6 months) from Nationalised / Schedule Bank shall be at least for Rs. 40 crores

    e) Should possess own Pre Engineering Building components manufacturing facility and design capability to match the present requirement.

    f) Should have designed and supplied PEB's with EOT crane capacity of 50 Tonnes and higher

5. The works executed in the own name of the tenderer only will be considered for eligibility criteria. The nominated committee may also visit the works executed by the contractor to ascertain the nature of work relating to PEB works before qualifying.

6. The tenderer is required to execute integrity pact in the prescribed pro forma with BHEL if qualified. The price bid of the respective tenderer will be opened only on submission of the said pact.

7. BHEL reserves its right to reject the tender on account of unsatisfactory past performance by the present tenderer in another project / sister unit awarded under different enquiry.

8. Dissimilar / irrelevant works will not be considered for eligibility criteria.

9. Documentary evidences (Xerox copies - attested) for turnover, works experience, P.F, & Sales Tax registration etc., all as indicated above & required in the tender document should be furnished without which it will not be taken into account.

10. The norms for qualification with prescribed score are attached in the Qualification Bid Document. Evaluation will be done accordingly. Minimum score required for qualification is 60.

11. If required the tenderer may have to execute additional scope of work at proportionate cost upto 20 % of the present contract value, keeping other terms and conditions unaltered.

12. Quoted rate shall be firm throughout the contract period of **9 months** and no cost escalation is allowed on any account.

13. The rate offered is for finished item of works and shall provide for the complete cost towards fuel, tools, tackles, plant & machinery, temporary works, labour, materials, levies, taxes**,** transport, lay-out, repairs, rectifications, maintenance till handing over, supervision, labour colonies, establishment, services, revenue expenses, overheads, profits & all other incidentals etc., complete. **However if the service tax is applicable for this contract work and free issue materials, the same will be reimbursed on production of valid document proof for having paid service tax by the contractor.**

14. Usually, working hours are limited to day time only. In emergency cases to carryout works during nights, it may be done so with the specific prior permission of BHEL. In such case, it is to be carried out in the presence of BHEL officials or their authorized persons.

15. The work shall be carried out as per Civil Engineering Department Work & Safety procedure, AWS / BIS specifications, standard code of practice and as per the instructions of Engineer-in-charge. The brief description of items of work is given in the bill of quantities provided in the Price Bid. **Tenderer has to quote rates both in figures and in words for all the items given in the Bill of Quantities provided in the Price Bid. (From page No. 16 to 17).**

16. For any item of work not covered in Bill of Quantities, the rate will be arrived at based on the conditions given in BHEL General Conditions of Contract in force.

17. **The contractor has to furnish the security deposit, as per Clause 13 of Tender Notice, attached in the Price Bid if the work is awarded. Also it is to be noted that after award of work the contractor has to furnish 50 % of security deposit before the commencement of work.**

18. The contractor should deploy the erection machineries like crane etc., required for the work at site till completion and handing over of the building. Also adequate number of the following tools & Plants / instruments shall be made available always at site for the works.

    a) Precise Leveling instruments and total station
    b) Laser beam instruments for accurate measurements
    c) Inter carting vehicle (tractor, hand trolley etc)
    d) Hydra cranes
    e) Power operated winches
    f) Mobile / Hydraulic crane
    g) Welding machine etc.

19. Since the responsibility for the quality, workmanship and accuracy of any work being carried out under this contract lies with the contractor, the contractor should ensure that no work is done without the presence of contractor's representative at the work spot.

20. Statement of completed works with detailed measurements along with material reconciliation statements shall be submitted by the contractor in the last week of every month for processing bill.

21. The decision of Engineer-in-charge shall be final and binding on the contractor regarding clarification of items in this tender schedule.

22. The works contract to be entered into with the successful tenderer will be governed by the BHEL Revised General Conditions of Contract in force.

23. The contractor shall strictly adhere to various labour laws in force.

24. The contractor has to submit the list of machineries to be deployed exclusively for this work, organization chart of their set up for the works and any change thereafter in the organization set up shall have the prior approval of BHEL.

25. The contractor should submit the programme for the completion of work and the list of machineries and site personnel to be deployed for the work along with tender.

26. The contractor should establish his own site office, fabrication yard, handling facility, storage facility etc., for which vacant land will be allotted on specific request for which the rent will not be collected.

27. The contractor is required to carry out erection activities as directed by the department officials. It is required to engage certain minimum strength of staff for effective supervision of works as indicated below:

Site in-charge / Construction Manager	-	1 No.
Planning Engineer and coordinator	-	1 No.
Qualified Surveyor	-	1 No.
Civil Engineer (Graduate in Civil Engineering)	-	1 No.
Structural Engineer (Graduate in Mechanical / Civil Engg.)	-	2 Nos.
Supervisor/Engineer (Diploma Holder)	-	3 Nos.

28. Adequate number of Quality Engineer and qualified Safety Engineer should be deployed at site.

29. To safeguard the persons working at height in roof, wall etc., sufficient number of Industrial Safety nets shall be provided at tenderer's cost in appropriate level and locations. The working hand including Supervisors, Engineers should wear the personal protective items and safety measures such as helmets, safety belts, shoes, etc., before entering into working place.

30. The tenderer has to deploy adequate labour of required categories such as Unskilled, Skilled, Welder, Fitter, Mistry, Technically experienced, etc. so as to execute the works simultaneously in all areas of work. Expertise labour only to be engaged for specialized items of work and the technical persons with experience shall have to produce valid certificate for verification.

31. The contractor shall follow norms of BHEL security system for movement of men & materials within the complex.

32. Exclusive Stores personnel should be engaged who would co ordinate with department official for clearance and collection of BHEL supplied materials if any for works.

33. Separate non-technical persons should be engaged for arranging daily gate passes for labours and vehicles entry in all the gates of the site Complex.

34. The tenderer shall carry out health performance test at his cost for all the workmen engaged in the work through a registered medical practitioner and produce certificate on demand.

35. It shall be the responsibility of the contractor to see that the workmen do not utilize the departmental canteen facilities. Contractor has to make his own arrangements to provide refreshment for the workmen.

36. All the works shall be executed as per the standard specifications as provided in TNBP / BIS.

37. The contractor should maintain proper accounts for materials if any supplied by the department and the same should be available at the site of work for verification and check by the Officials of this Organisation at any time.

38. All materials brought by the Contractor for incorporation in the work shall be got inspected and approved by the Engineer-in-charge before they are incorporated in the work.

39. The contractor should use only the materials of brand and quality as approved by BHEL.

40. All materials and consumables brought by the contractor should have manufacturer's certificate.

41. All tools and plants required for all the works covered under this contract will have to be brought by the contractor.

42. All safety measures are to be followed during execution of work, particularly while working at heights. Sufficient care shall be taken by the contractor to avoid damages to the buried pipe lines, cables and other infrastructure like railway lines if any etc.

43. Contractor's materials and tools & plants shall have to be brought inside factory with proper invoice / voucher and make necessary entry in the security gate. They should maintain proper record for tools and plats, materials, etc., brought inside the factory complex.

44. The contractor should extend full co-operation with the third party inspection agencies engaged by BHEL to adhere to the Quality Control Procedures at the places of fabrication and erection .

45. The contractor should extend full co-operation to the other contractors who may be doing other works in the same area to enable them to execute their portions of work without any delay or difficulty.

46. The Contractor will have to make his own arrangements for water & compressed air without any extra claims.

47. On the written request from the contractor **Electrical energy required for the work may be given by this organization at any one point at the site of work at chargeable basis.** The approximate power requirement shall have to be indicated while submitting the tender. BHEL does not accept any liability whatsoever for non-supply, delay in supply or failure of supply of electrical energy. Contractor shall ensure that there is no wastage of electrical energy otherwise supply is liable to be stopped at contractor's risk and cost. The contractor shall make leak proof / fire proof shed and provide control panel board of required capacity and lay the required cables at their own cost for further distribution.

48. Purchase preference policy if applicable will be extended to CPSE bidders subject to other terms & conditions as provided in the office memorandum issued by DPE. The tenderer has to furnish copy of Government circular for claiming purchase preference.

49. Tenderers are requested to furnish the duly filled in E format attached as separate sheet along with a cancelled cheque leaf to accept Electronic fund transfer / R T G S transfer for any payment from BHEL, Trichy.

50. The main work order may further be split into few sub work orders. The process of billing, material tallying and submission of completion reports will be according to the individual sub work orders.

51. Bank Guarantee format can be obtained after award of work in case of successful tenderer.

52. No advance / mobilization advance is payable for this work.

53. LD / Penalty clause is applicable as per General Conditions of Contract in force.

54. BHEL reserves its right to accept / reject any or all the tenders without assigning any reasons.

55. Also BHEL reserves its right to finalize the contract through reverse auction for which only qualified tenderers will be provided with necessary documents containing reverse auction rules, terms and conditions for this purpose.

56. The contractor should deploy precise instruments like total station, measuring devices using laser beam to ensure error free line, level and alignment of holding down bolts etc. The contractor is required to deploy skilled experienced labourers in handling such instruments and has to coordinate with other agencies like Civil contractors to achieve accuracy for trouble free erection of structures.

57. The contractor shall effect and maintain professional indemnity insurance for the amount equal to Indian Rupees 25 Lakhs. The contractor shall produce evidence of coverage of the professional indemnity insurance before any payment is released. The insurance which shall insure the contractor's liability by reason of professional negligence and errors in the design of the works, shall be valid for 5 years from the date of issue of Completion certificate. The employer will not issue final payment certificate until the contractor has produced evidence that coverage of professional indemnity insurance has been provided for the aforesaid period

REVERSE AUCTION

BHEL reserves the right to go for a Reverse Auction (RA) instead of Opening the submitted sealed bid, which will be decided after technical evaluation. Information and general terms and conditions governing RA are given below.

GENERAL TERMS AND CONDITIONS OF RA

Against this tender for the subject work/system with detailed scope of work as per tender specifications, BHEL may resort to "REVERSE AUCTION PROCEDURE" i.e., ON LINE BIDDING ON INTERNET.

1. For the proposed reverse auction, technically and commercially acceptable bidders only shall be eligible to participate.

2. BHEL will engage the services of a service provider who will provide all necessary training and assistance before commencement of on line bidding on internet.

3. BHEL will inform the vendor in writing in case of reverse auction, the details of Service Provider to enable them to contact & get trained.

4. Reverse Auction rules like event date, time, Start price, bid decrement, extensions etc. also will be communicated through service provider for compliance.

5. Vendors have to fax the Compliance form in the prescribed format (provided by Service provider) before start of Reverse auction. Without this, the vendor will not be eligible to Participate in the event.

6. BHEL will provide the calculation sheet (e.g., EXCEL sheet) which will help to arrive at "Total Cost to BHEL" like Taxes and Duties, Freight charges, Insurance and loading factors (for non-compliance to BHEL standard Commercial terms & conditions) for each of the vendor to enable them to fill-in the price and keep it ready for keying in during the Auction.

   However if the service tax is applicable for this contract, the same will be reimbursed on production of valid document proof for having paid service tax by the tenderer.

7. Reverse auction will be conducted on scheduled date & time.

8. At the end of Reverse Auction event, the lowest bidder value will be known on the network.

9. The lowest bidder has to Fax the duly signed Filled-in prescribed format as provided on case-to-case basis to BHEL through Service provider within 24 hours of Auction without fail.

10. Any variation between the on-line bid value and the signed document will be considered as sabotaging the tender process and will invite disqualification of vendor to conduct business with BHEL as per prevailing procedure.

11. In case BHEL decides not to go for Reverse Auction procedure for this tender enquiry, the Price bids and price impacts, if any, already submitted and available with BHEL shall be opened as per BHEL's standard practice.

12. BHEL reserves the right to negotiate if need be, with the "L1" vendor of the Reverse Auction

Force Majeure clause: If at any time during the continuance of this contract the performance in whole or in part by either party of any obligations under this contract shall be prevented or delayed by reason, of any war, hostilities, acts of the public enemy, civil commotion, sabotage, fires, explosions, epidemics, quarantine, restrictions or acts of GOD (hereinafter referred to as events) then provided notice of happening of any such events is given by either party to other within twenty one days from the date of occurrence thereof neither party shall reason of such events be entitled to terminate this contract nor shall either party have any such non performance and delay is resumed as soon as practicable after such events has come to an end or ceased to exist. If the performance in whole or part of any obligation under this contract is prevented or delayed by reason or any such event claims for extension of time shall be granted for period considered reasonable by BHEL subject to prompt notification by the tenderer to BHEL of the particulars of the events and supply to the BHEL if required of any supporting evidence. Any waiver of time in respect of partial installment shall not be deemed to be a waiver of time in respect of remaining deliveries.

The correspondence exchanged against the tender from both tenderer and BHEL through email are considered as valid document legally though it is not signed. It is treated as valid confirmations made on behalf of the respective company and very much comes under the legal ambit of the business transaction and hence it is binding on both the parties to the business.

Any transaction pertaining to the tender from both the parties of business done round the clock irrespective of the office or business hours of the companies, are valid legally and binding on both the parties. This applies to the extent only in such cases where deadline time for transaction is not specifically declared by either or both the patties to the business.

In case Letter of Intent (LOI) is issued through email, the PC generated time and date of mail shall be construed as the official time and date of release of LOI. In as much as this date is within the last date of validity given by the bidder the LOI is said to have been issued within the validity period and shall be binding on both the parties to the business.

Tenderers participating in the tender should declare in their technical bid that whether they have been black-listed / kept on hold for a specified period / given Business holiday for a specified period by any Public sector undertaking or Government departments. The reasons for such action with details and the current status of such hold shall be clearly furnished to BHEL. If no such details are mentioned in the offer then it will be construed that the subject bidder is not under any such hold. But at a later date if it comes to the notice of BHEL about any such hold under enforcement on the subject bidder, BHEL will have every right to reject the offer of such vendors at any point of time and also under any stage of the finalisation of the subject tender irrespective of the status of the subject bidder in that tender. Such bidders will not be permitted to participate in the further tender proceedings and will be communicated suitably. They will not be also considered for any ongoing tenders even if participated till the hold is officially lifted and confirmed in writing.

MANDATORY COMMERCIAL ACCEPTANCE TERMS

Terms of Payment:

1) 80% progressive payment on receipt of sequential acceptable PEB components at site on pro-rata basis against approved BOQ.
2) 10% on erection on pro rata basis of identified PEB components.
3) 10% on successful commissioning and handing over of the PEB against a performance bank guarantee valid up to the warranty period of one year.
4) No mobilization advance is entertained.

Corporate Warranty:

The tenderer shall furnish Corporate Guarantees for 10 years against structural stability and roof leak proofness for all structures.

Nature of award of Contract:

Only an indivisible contract shall be executed including supply, erection and handing over. No other form of contract shall be entertained.

Material & QCP

Before commencing fabrication, the tenderer shall obtain BHEL's prior approval for the usage of material. The tenderer shall produce necessary documentation (material test reports). The material should be sourced from the under mentioned sources preferably.

Steel for Frames- Essar Steel / Jindal / SAIL / ISPAT/ Tata / RINL

Roof and wall cladding coils- Tata Bluescope / NIPPON / Union Steel

The tenderer shall submit the proposed quality control procedure for fabrication and erection along with the tender.

General:

The general approach and methodology proposed for carrying out the items covered in the Scope of work should be submitted, including such detailed information as deemed relevant. Apart from the above, contractor shall provide details and number of equipments, to be mobilized to complete work as per specifications, in stipulated time schedule.

Detailed overall work programme and a bar chart indicating the duration and timing of all major activities showing the desired milestones.

List of codes of standards in addition to those mentioned in the specifications.

The tenderers shall submit the quality assurance plan duly signed by the corporate head or any other authorized person.

No information relating to financial terms of services should be included in the Qualification bid. Proposals are to be submitted to determine that the tenderer has a full comprehension of the work. Where a tenderer's technical submittal is found non-complaint with the requirement or work, it may be rejected. This process is to assure that only technically acceptable proposals are considered for the work.

SECTION A

1.1 INTERFACES:

The scope of work for the interfaces work under the purview of this contract are detailed below.

The interfaces include but are not limited to:

a. Design and detail drawing of Column foundation (pedestal) including vetting by the same agency engaged for PEB as stated in the tender. The soil investigation report will be provided by BHEL.

b. Design and Supply of holding down bolts to Civil Contractor in time for the timely and uninterrupted progress of pedestal casting.

c. Interfacing with Civil & Electrical Contractors.

1.1.1 The rates are inclusive of all cost but not limited to the cost such as for plants, Equipments, tools, all type of labours, supervision, all materials from the source of supplies as approved by Engineer in charge/Employer including all lead and lifts, transport, all temporary works, erection maintenance, contractors profits & establishments/overheads together with preparation of designs and drawings pertaining to casting yard et. All general risks, taxes, royalties, duties, CESS, OCTROI and other levies, insurance liabilities and all other obligations set out or implied in the contract for completion of work except otherwise specified in Bill of Quantities

1.1.2 The Contractor shall plan his works keeping in view restriction of approach and availability of space and time.

1.1.3 The area in which the work lies is mostly plain terrain.

1.2 DESIGN CRITERIA:

The shop drawings should cover all the items pertaining to all temporary works required for fabrication, shop assembling, transportation scheme for various structural elements. The Contractor shall himself formulate a practical and viable scheme for fabrication of all structural members and launching scheme. The tenderer should, along with the tender specify the scheme that he proposes to adopt for carrying out all the works including fabricating &, transporting the same to site and Launching scheme.

1.3 REFERENCE TO THE STANDARD CODES OF PRACTICE:

1.3.1 The contractor shall make available at site all relevant Indian Standard Codes of practice as applicable and other relevant British / German /American Standard.

1.3.2 Wherever Indian Standards do not cover some particular aspects of design / construction, relevant British / German / American Standards will be referred to.

1.3.3 In case of discrepancy among Standard codes of practice TECHNICAL Specifications and provision in sub-clauses in this NIT, the order of precedence will be as below:

i. Provision in N.I.T.

ii. Technical Specifications

iii. IS 800 -2007

iv. Standard Codes of Practice

v. In case of discrepancy among Standard Codes of Practice, the decision of the Engineer in charge will be final.

1.4 FABRICATION DEPOT:

Contractor shall use his own premises / workshop for fabrication of structural steel work.

1.5 ASSOCIATED WORKS:

Works to be performed shall also include all general work preparatory to the fabrication of structural steel work, launching of steel structures during the works of any time necessary for the due and satisfactory construction completion and maintenance of the works to the intent and meaning of the drawings adopted and technical specifications, to best Engineering standards and orders that may be issued by the Engineer in charge from time to time, compliance by the agency with all Conditions of Contract, supply of all materials, apparatus, plants, equipment, transport, offices, stores, workshop, staff, labour and the provision of proper and sufficient protective works, temporary fencing, lighting and watching required for the safety of the public and protection of works on adjoining land, first-aid equipment, sanitary accommodation for the staff and workmen, effecting and maintenance of all insurances, the payment of all wages, salaries, provident fund, fees, royalties, duties or the other charges arising out of the fabrication of works and the regular clearance of rubbish, clearing up, leaving the site perfect and tidy on completion.

1.6 PRELIMINARY DRAWINGS:

Preliminary drawings in tender documents represent Employer's proposal based on preliminary design. Detailed working drawings will be submitted by the contractor based on the approval of structural design by the Engineer in charge.

1.7 TIME SCHEDULE:

The agency shall submit with the tender "Time Schedule" for completion of various portions of works. This schedule is to be within the overall completion period of 9 Months for the supply and erection of structural steel work. The detailed programme in the form of a quantified bar chart or CPM network shall include all activities from start to completion.

SECTION B

SCOPE OF WORK

1.0 GENERAL:

The scope of work for Pre-Engineered Steel Building System is as defined in the following sections under the contract which includes design of PEB and foundation including HD bolt, manufacture, supply and erection of Structural Steel System, Metal Roof System, Wall System, Trims and Flashings, Turbo Ventilators and all accessories as required for the successful and satisfactory completion of the contract.

DETAILED SCOPE OF WORK:

1.1. Building components

-Roof & Side sheeting

- Purlins, sag rods cleats, bolts and nuts,

- Turbo Ventilators of required numbers as per the design

- 2 mm thick Polycarbonate sheet for day lighting for 3% on roof area

-Purlins spacing based on load and deflection limits,

-Provision in the column and crane girder for running water line, compressed air line, LPG line, DSL

-Steel Portal Frames including Crane leg / stepped column,

-Rafter bracings, Column bracings - Diagonal rod / Angle Bracing

-Gable end sheeting, purlin, columns,

- FRP lined Gutters - calculation to be shown to justify the size,

-Down take pipes, calculation to be shown to justify the size,

-Crane girders EOT, legs connections, bolts to roof Leg and Crane leg,

-Semi gantry girders including brackets as shown in the drawing

-Buffer stop 4 nos. in each Bay

-Stair case to approach crane 2 Nos. in each bay

-Crane walk way and Hand Rails on both sides with toe plate and 5mm chequred plates, on both sides of the bay.

-Sliding doors 6 nos. 6mx6m,

-Framed openings (5.50 x 5.50M) for sliding doors

-Canopy for openings totally 6 Nos. of 7.5M length and 3m cantilever with ends closed.

-Louvers for full length of the building, eaves strut

-Foundation Bolts as per design.

-Connecting bolts (high strength),

-Base plates with Gussets for stiffening as per design.

-Ridge ventilator of size 900 mm throat for the entire length .

-Flashing, trims, eave gutter & down spouts

-Fasteners : Mechanically galvanized Hex- washer head self drilling fasteners with integral EPDM seals

- All primary members with factory applied one coat of zinc chromate red oxide primer and two coats of synthetic enamel paint

- Purling and grits are to be pre-galvanised.

- Double side welding for built up members.

1.2. Testing of all materials and quality control as per quality plan.

1.3. Erection of all the components mentioned in the scope of work.

1.4. Load test on crane girders (after crane erection).

All aspects of quality assurance, including procurement & testing of materials and other components of the work, as specified or as directed:

a. Clearing of site and handing over of all the works, as directed,

b. Maintenance of the completed work during the maintenance period ONE YEAR.,

c. Submission of completion (i.e., 'as-built') drawings and other related documents as specified:

Any other requirement for the commissioning of the buildings in all respects in accordance with the provisions of the Contract and/or to ensure the structural stability and safety during and after construction

2.0 DETAILED ENGINEERING:

2.1 The contractor shall design the structures and prepare all the required drawings needed for correct and accurate construction. The design shall be strictly in accordance with the "Design Specifications" and building description given elsewhere in the tender .

2.2 The contractor shall submit Design basis and General Arrangement(G.A) of the structure along with required explanatory sketches/drawings in three sets plus one soft copy and get the same reviewed by BHEL before starting the final design and Ready for Construction (RFC) drawings. Ten days time will be required by BHEL for approval. The contractor shall thereafter furnish six sets of hard copy of column foundation design along with a soft copy.

2.3 Construction of the structure shall not be taken up at site till all the drawings are reviewed by BHEL and comments/suggestions given by consultants/BHEL are incorporated.

2.4 BHEL reserves the right to review any/all or none of the designs and drawings. Review by BHEL shall not relieve the contractor of his responsibility for correct design and execution of the works.

2.5 The final design and RFC drawings shall directly adhere to the reviewed design basis and general arrangement and shall incorporate all the comments / suggestions given by BHEL without any extra cost to the Owner and any implication on time schedule for completion of work.

2.6 The contractor shall submit six sets of hard copy of working drawing along with soft copy and on completion of erection and construction, shall submit to BHEL "As Built" drawings in 6 sets of hard copy along with a soft copy.

3.0 CONSTRUCTION :

3.1 Erection of all structural works, roofing, cladding, framed openings etc., including supply of all materials, labour, supervision, plant, tools and tackles etc., shall be carried out by the Contractor.

3.2 All materials and construction shall conform to the Material and Painting Specifications given elsewhere in this document.

3.3 Erection of Pre-Engineered Building shall be done in the presence / guidance of PEB Manufacturing experts.

3.4 Foundation Bolts shall be aligned, leveled, fixed and grouted by the civil contractor. The alignment and levels are to be checked and certified by the PEB Manufacturer's Engineer before concreting by Civil contractor.

3.5 No welding is permitted at site unless otherwise cleared by the Consultant / BHEL.

3.6 No wire bracing is permitted.

3.7 Crane leg (column) should be designed without flange bracing.

3.8 Columns are to be designed for minor axis eccentricity

SECTION –C

BUILDING DESCRIPTION

1.0 The brief building description for all the six bays are as below:

	Bay I	Bays 2 - 5	Bay 6
Bay width	30 M	30 M	30 M
Length	180 M c/c of column	234 M c/c of column	180 M c/c of column
Clear Height	12.50 M clear at Knee	12.50M clear at Knee	14.50M clear at Knee
EOT span	28.5m Rail c/c	28.65m Rail c/c	28.5m Rail c/c
Semi gantry Span	Nil	14.00 m Rail c/c	14.00 m Rail c/c
Roof slope	I in 10	I in 10	I in 10
Bay spacing	6 Bays @ 30 M	30 Bays@ 7.40 M + 1 Bay @12.00 M	6 Bays @ 30 M
Roof & Wall cladding	26 gauge high tensile colour coated standing seam profiled galvalume 550 Mpa sheets to make 0.47MM TCT for roof and 0.50MM TCT for wall cladding as indicated in Section F		
Framed openings	2Nos.– 5.5 x 5.50M	2 Nos. 5.5 x 5.50M	2 Nos. 5.5 x 5.50M
Canopies	2Nos. – 7.50M(L)x 3.0M projection	2Nos. – 7.50M(L)x 3.0M projection	2Nos. – 7.50M(L)x 3.0M projection
EOT	20 MT – 2 Nos + 10 MT – 1 No	20 MT – 2 Nos + 10 MT – 1 No in each bay	20 MT - 2 Nos + 10 MT 2 Nos
Semi gantry	Nil	5 MT – 2 Nos in each bay - full length	5 MT – 1 No. full length
Sliding door	2Nos.– 6 x 6 M matching exterior	2 Nos. 6 x 6 M matching exterior	2 Nos. 6 x 6 M matching exterior
Crane rail	Supply by BHEL, fabrication and erection by PEB manufacturer		
Crane columns & Gantry girder	By PEB manufacturer		
Ridge ventilator	900 mm throat for the entire length		
Turbo ventilator	As per design considering 5 air changes per hour		
Eaves Gutter & Down take pipes	Eaves gutter & down take pipes are of same material that of roof sheet with down take pipe and valley gutter with FRP lining.		
Louver	Using same cladding sheet for full length of sizes as per GA drawing		
Provision for future expansion	Yes	Yes	Yes
Expansion Joint	As per IS 800		
Utilities	Design and necessary provision in the column and crane girder for running water line, compressed air line, LPG line, DSL etc.		

SECTION – D

DESIGN SPECIFICATIONS

1.0 GENERAL :

The design considerations given hereunder establish the minimum basic requirements for the design. However, structure shall be designed for the satisfactory performance of the functions for which the same is to be constructed.

1.1 Whenever any reference to IS Code is made, the same shall be taken as the latest revision (with all amendments issued there to-) on the notified date of submission of tender .**For this work IS 800-2007 is to be followed.**

1.2 Apart from the IS Codes mentioned in particular for wind, live and earthquake loads in the various clauses of this specifications, all other relevant codes such as American standards (AISC, MBMA, AISI & AWS specifications) related to the specific job under consideration and / or referred to in the above mentioned codes may be followed wherever applicable, if the specifications for the same are not available in the relevant IS codes.

1.3 In case of any variation / contradiction between the provisions of Codes and the specifications given hereunder, the provisions given in these specifications shall be followed.

2.0 LOADING

2.1 **General**

The structure shall be designed for all loads, including the weight of structure, live load, wind or earthquake. Due consideration shall be given to loading during the construction/erection phase and accounted for in the design. The design to be cater for the proposed future expansion also.

2.2 **Design Loads**:

2.2.1 **Dead Load :**

Self Weight of Structure including Purlins, Sheeting, Girts Bracings weight of turbo ventilators to be added as Dead load. etc.

2.2.2 **Imposed Load (Live Loads)**

Live loads shall be as per IS – 875. For sloped roofs up to 10 deg. it shall be 0.75 KN/M².

2.2.3 **Wind Load** :

Wind loads shall be as per IS : 875.

The basic wind speed of the site is taken as 47 m/s

Values of coefficients K_1, K_2, K_3 shall be as K_1 = 1.0 for permanent structures. K_3 = 1.0, K_2 shall be taken for relevant class of the structure with Category 2 terrain with respect to the actual height of the structure. **The design life span of all structures shall be taken as 50 years.**

2.2.4 Earthquake Load :

Seismic forces shall be as per IS:1893, ZONE II as applicable to Tiruchirapalli.

3.0 **VERTICAL DEFLECTION AND HORIZONTAL SWAY LIMITS :**

a) Limiting Deflection : The limiting permissible vertical deflection for structural steel members shall be as specified below :

- Structures / structural components :as per IS 800 2007 code.

b) The limiting permissible horizontal deflection for as per IS 800 2007 code where `h' is height of building at eaves,

4.0. **FRAME ANALYSIS :**

The frame shall be analyzed with fixed base, suitable for future expansion along end walls, as given in the general arrangement drawings and specifications.

5.0 **DESIGN CHECK** :

The design calculation should be checked by reputed institution like IIT/ IISc / SERC at the tenderer's cost. BHEL may cross check the same set of document with another third party institution of their choice and get the approval. Comments/corrections by the third party consultant should be incorporated in the drawing and executed at site at no extra cost to BHEL. It shall be the responsibility of the firm to ensure structural stability of the building. The total design of the building shall be done to meet the design parameters given in design or technical specifications.

01. Loads as per clause 3.2 of IS-800 -2007 and IS-875

Design as per IS-800-2007.

Loading combinations as per Clause 3.5 and Table-4 IS-800-2007.

Deflection both lateral & Vertical as per Table 6 – IS-800-2007.

Design should be based on Limit State method.

02. Both Limit States of strength as well as serviceability should satisfy the performance requirements refer Clause 5.2.2.1 and 5.2.2.2 of IS-800-2007.

Factors governing the ultimate strength as per clause 5.5. of IS-800-2007 should be ensured.

Limit states of serviceability as per clause 5.6 of IS-800-2007 should be ensured.

Method of analysis may any one of the method prescribed as per clause 4.1 of IS-800-2007.

Notional Horizontal loads as applicable as per clause 4.3.6 should be applied on the structure and checked.

If Elastic analysis is carried out it should be based on 4.4 of IS-800-2007.

Effective length of compression member should be as per clause 7.2 and maximum values of effective slenderness ratios should be as per Table 3 of IS-800-2007.

Limiting width to thickness ratio of elements may be as per Table 2 0f IS-800-2007.

Transfer of Horizontal forces due to wind and EQ to the foundation should be ensured by proper means. Uplift duce to wind and EQ should also be checked for beams and columns, purlins.

Columns should be treated as fixed at foundation level.

Erection loads to be taken in design.

For bolts nuts and washers reference to be made to clause 2.4 of IS-800-2007.

Effective sectional area should be as per clause 7.3.2.

Gusseted column bases should be as per clause 7.4.2.

In the design laterally supported beams reference should be made to clause 8.3.4

Combined stresses refer clause 9.3 of IS-800-2007.

The Design of Crane Girder should account for the following:

01. Impact Factor 25%.

02. Limiting deflection as per Is-800-2007.

03. Minimum thickness of web refer clause 8.6.

04. Crane Girder to be designed for Tandem operation

05. Buffer stopper to be designed for Energy absorption.

06. Knee braces from the crane girder to the crane run way columns are not recommended.

07. Crane runway girders are to be designed as simply supported. Direct interconnection that would restrain relative rotation between adjacent ends of successive girders is not recommended.

08. Crane runway girders shall be designed, detailed and fabricated to resist fatigue damage

09. Crane runway girders need not have bottom flanges stiffened by means of a bracing system connected to an adjacent girders or stiffening truss.

10. Intermediate stiffeners shall be welded to the top flange with a full penetration (beveled) weld and should be stopped short of bottom flange. The end bearing stiffness should be welded to the top and bottom flange with a full penetration (beveled) weld. Alternatively end bearing stiffness may be welded to the bottom flange to obtain full bearing.

11. All welds between stiffeners and web plates or flange plates are to be continuous weld.

12. Brackets should not be used to support crane runway girders.

13. Web plate and Flange plate splice welds shall be 100% inspected by radiographic or ultrasonic inspection. Where flange to web welds are complete penetration welds they should be 100% inspected by ultrasonic inspection. Where flange to web welds are fillet welds they should be 100% inspected by liquid penetration or magnetic particle inspection.

14. In the design of crane girder web, it is to be noted that tension field design introduced into the AISC specification in 1961 is not permitted for crane runway girders.

Design and detailing for earthquake loads should be as per section 12.
For Fatigue resistance design for Crane graders etc. refer section 13.
For durability refer section 15.

Please refer the following drawings for the loading details for EOT and Semi gantry cranes.

6.0 APPLICABE CODES:

IS - 875 PART 1 TO 5,

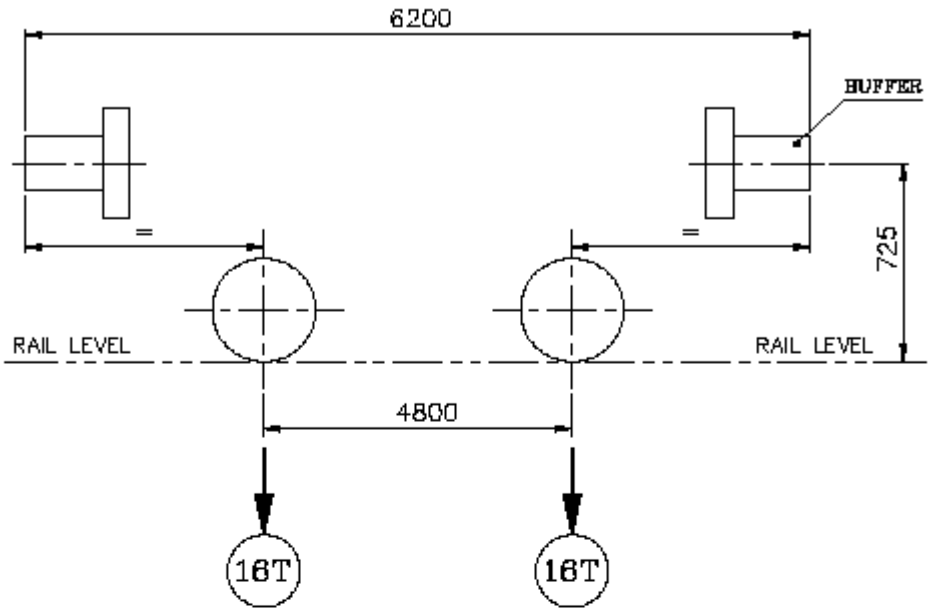
IS 1893- 2002 ,

IS 800-2007,

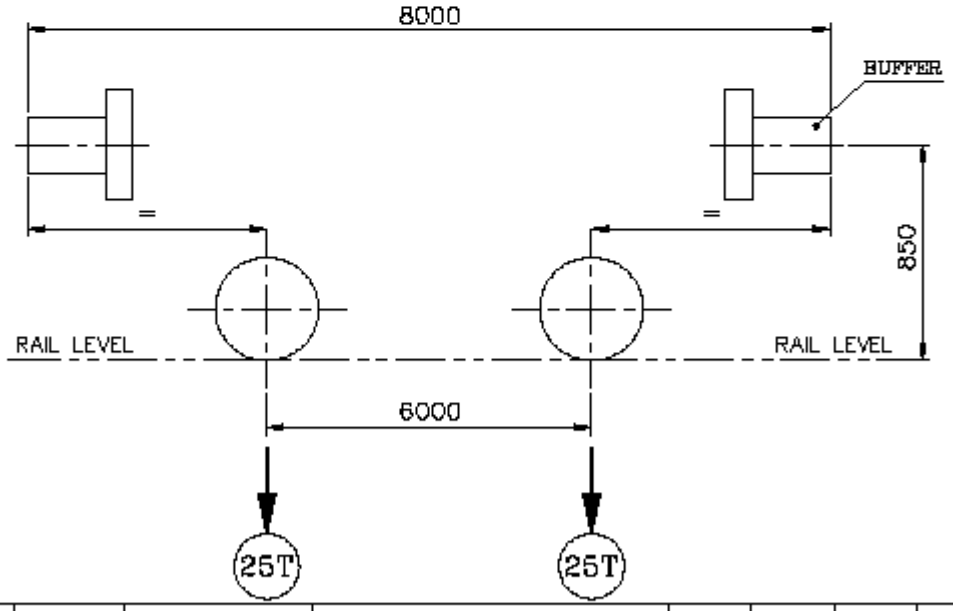
IS 801 -1975 ,

IS 807 - 2006

WHEEL LOAD 10T. EOT CRANE

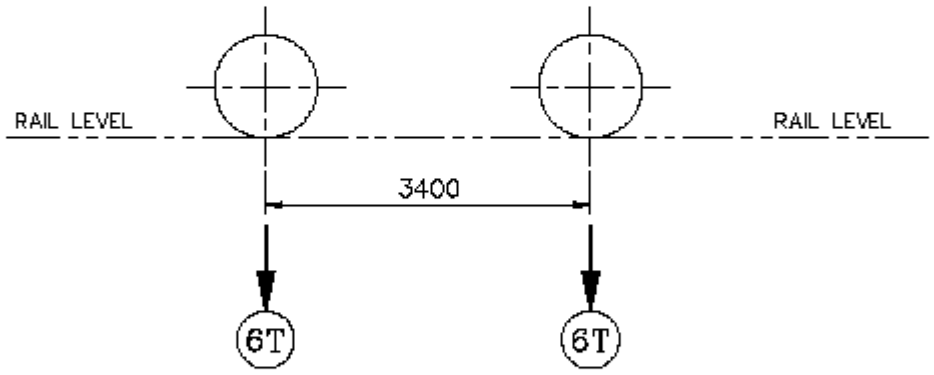


WHEEL LOAD 20T. EOT CRANE



	DRAWN	GGR					
	DATE	09/06/10					
	MACHINE:	EOT		TYPE:	10T & 20T.		
	TITLE: WHEEL LOAD 10T & 20T.		M&S-PD-10-017				REV.

WHEEL LOAD 5T. SEMI GANTRY CRANE



	DRAWN	GGR					
	DATE	09/06/10					
	MACHINE:	SEMI GANTRY		TYPE:	3T & 5T.		
	TITLE: WHEEL LOAD FOR 5T. SEMI GANTRY CRANE			M&S–PD–10–018			REV.

E- REFERENCE TO STANDARDS & PROCEDURES

1.0. **STEEL STRUCTURES**:

1.1. This section covers the general requirements of designing, preparing necessary drawings, and providing, fabricating, painting, transporting, erecting, fixing in position Structural steel work for buildings, including all necessary temporary works and conducting of associated tests.

1.2. Contractor shall ensure that the Technical specifications detailed herein are carefully read and understood in conjunction with, and related to BILL of quantities, and the contractor in his rates includes all requirements defined herein and in other parts of the Contract Document. Works to be performed shall also include all general works preparatory to the fabrication of structural steel work, launching of steel structures during the works of any kind

1.3. **APPLICABLE CODES AND STANDARDS:**

The codes and standards generally applicable to the work of this section are listed below. Latest revisions of the codes shall only be applicable.

IS-875 Part I:Code of Practice for Design Dead Loads for Building and Structures
IS-875 Part I:Code of Practice for Design Dead Loads for Building and Structures
IS-875 Part II:Code of Practice for Design Imposed Loads for Building and Structures
IS-875 Part III:Code of Practice for Design Wind Loads for Building and Structures
IS-1893 (2002): Criteria for Earth Quake Resistance Design Structures
IS-800 (2007):Code of Practice for General Construction in Steel. And all the codes listed in annex-A of the code
IS-801 (1975)::Code of Practice for use of Cold-Formed Light Gauge Steel Structure

IS-807 (2006)::Design, Erection & Testing (Structural Portion) of Cranes and Hoists – Code of Practice.

IS-816 (1969): Code of Practice for use of Metal Arc Welding for General Construction.

IS: 102 Ready mixed paint, brushing, red lead non-setting, priming

IS: 104 Ready mixed paint, brushing, zinc-chrome, priming.

IS: 800 Code of Practice for General Construction in Steel

IS: 801 Code of Practice for use of Cold Formed Light Gauge Steel

Structural Members in General Building Construction.

IS: 806 Code of Practice for use of Steel Tubes in General Building Construction.
IS: 808 Dimensions of Hot Rolled Steel Beam, channel and angle sections

IS:811 Cold Formed Light Gauge Structural Steel Sections.

IS:813 Scheme of Symbols for Welding

IS:814 Covered Electrodes for Manual Metal Arc Welding of Carbon and Carbon-Manganese Steel

IS:816 Code of Practice of use of Metal Arc Welding for General construction in Mild Steel.

IS:818 Code of Practice for Safety and Health requirements in electric and Gas Welding and Cutting operations.

IS:822 Code of Procedure for Inspection of welds.
IS:875 Code of Practice for Structural Safety of Building, Loading standards

IS:1024 Code of Practice for use of welding in Bridges and Structures Subject to Dynamic Loading.

IS:1120 Coach Screws

IS:1161 Steel Tubes for Structural Purposes

IS:1182 Recommended practice for Radiographic Examination of Fusion Welded butt Joints in Steel plates.

IS:1363 Hexagon Head Bolts, Screws and Nuts (Grades –C)

IS:1364 Hexagon Head Bolts, Screws and Nuts (Grades A&B)

IS:1365 Slotted Counter-sunk Head Screws

IS:1367 Technical Supply condition for threaded fasteners.

IS:1852 Rolling and Cutting Tolerances for Hot Rolled Steel Products.

IS:1977 Low Tensile Structural Steel

IS:2016 Plain washers

IS:2062 Steel for General Structural Purposes

IS:2074 Ready Mixed Paint, Air drying, Red Oxide-Zinc chrome priming.

IS:3063 Fasteners-Single Coil Rectangular Section Spring Washers

IS:3443 Crane Rail Sections

IS:3600 Testing methods of fusion welded joints and weld metal in steel.

IS:3613 Acceptance tests for wire flux combination for submerged, arc welding.

IS:3757 High strength structural bolts.

IS:4000 Code of practice for high strength bolts in steel structures

IS:4923 Hollow Steel sections for structural use.

IS:5369 General Requirements for plain washers and lock washers

IS:5624 Foundation bolts.

IS:6227 Code, of practice for use of metal arc welding in tubular structures

IS:6623 High strength structural nuts.

IS:6639 Hexagonal bolts for steel structures.

IS:8500 Structural Steel Micro-alloyed (Medium and high strength qualities)

1.4 DESIGN:

1.4.1 The contractor will be required to carry out detailed design of the structures, prepare engineering drawings and detailed 'shop drawings', get these approved from Engineer, and then carry out the fabrication work based on approved drawings.

1.4.2 Contractor's designs shall, unless otherwise specified, be based on provisions of relevant BIS codes. Design guideline and design parameters are mentioned in this document.

Where corresponding parameters mentioned in BIS codes are different from those mentioned in Design Specification the latter shall take precedence.

1.4.3 Contractor's designs shall be based on general description of buildings given in earlier pages of this document and those shown in tender drawings Where information given in general description of the building does not tally with the tender drawings, information given in tender drawings shall take precedence.

1.4.4 Where codes and standards listed in earlier pages do not cover the requirements of design, the contractor may refer to other international standards of design only in those cases, However such references should be made only with the approval of the Engineer in charge.

1.4.5 Contractor shall submit his design calculations and 'Engineering Drawings' along with proof design to the Engineer in charge for his approval. The contractor is advised to discuss his design philosophy and design procedure with the Engineer in charge before proceeding with the final design work.

1.4.6 It shall be the responsibility of the contractor to obtain all relevant design information from the Engineer in charge for preparing his design, and other utility services supported by the structure.

1.5 DRAWINGS:

1.5.1 Tender Drawings shall be the 'Basic' drawing for developing design drawings. Design drawings shall then be developed in to final 'Shop Drawings' to be prepared by the contractor. For preparing shop drawings, the contractor shall obtain written approval from the Engineer in charge.

1.5.2 Tender drawings furnished to the contractor shall form a part of these specifications. The contractor shall consult these in detail for all the information contained therein, which pertains to and is required for his work.

1.5.3 Revisions to drawings, even after release for preparation of shop drawings, are likely to be made to reflect additional data, or, additional details defining updated requirements. Revisions to drawings and any new drawings made to include additional work for the Contractor shall be considered a part of this specification and contract. Extra claims by the contractor on this account shall not be entertained.

1.5.4 It shall be clearly understood that the Tender drawings are only informative drawings and are not intended to show exact and final information or specific connection details.

1.5.5 In case of variations in 'Drawings' and 'Specifications', the decision of the Engineer in charge shall be final and binding. Should the Contractor during the execution of his work, find discrepancies in the information furnished to him, he shall refer such discrepancies to the Engineer in charge before proceeding with such work.

1.5.6 Contractor shall prepare all fabrication and erection drawings necessary for completing the work satisfactorily.

1.5.7 Drawings shall be of one standard size, and shall be clear and legible. Drawings shall be based on Tender drawings supplied to the contractor, but he shall verify actual clearances and dimensions from site on works executed by other agencies and from Engineer in charge.

1.5.8 Shop drawings shall include, but not be limited to:-

a. Detailed marking plans.

b. Details member connections and connections to other structures and components of building.

c. Detailed dimensions for fabrication indicating dimensional modifications required for field conditions

d. Welding and bolting procedures to be used both at shop and field.

e. Cambers required to be provided, and permissible tolerances in fabrication.

f. Assembly and Erection sequences indicating components to be connected at field.

g. Complete bill of materials for each component (preferably drawing wise.)

1.5.9 Before submitting of shop drawings and calculations to the Engineer in-charge for his approval, these shall be checked and certified by reputed institution like IIT/ IISc / SERC at the tenderer's cost.. Till such time the shop detail of a component is approved, fabrication work for the component shall not be started.

1.5.10 If necessary and called for by the Engineer, shop drawings shall be revised to suit modified requirements and these shall be resubmitted for approval of the Engineer in charge.

1.5.11 While the shop drawings prepared by the contractor, and approved by the Engineer in charge represent the correct interpretation of work to be done, the contractor is not relieved of his responsibilities for:-

a) Dimensional accuracy

b) Correctness of engineering and design of connections

c) Fit of parts

d) Details

e) Errors or omissions

f) Material and workmanship

g) Methodology of fabrication and erection

h) Safety of performance

1.6 . SUBMITTALS:

1.6.1 On commencement of the Project, the Contractor shall submit the following to the Engineer in charge:-

A. Prior to the technical submittals, the contractor shall submit detailed baseline program and methodology indicating the proposed overall schedule for documentation such as calculations, shop/working drawings, plan/procedures and records. Submission of samples, process of fabrication / delivery to site storage yard for the approval of the Engineer in charge.

B. Complete fabrication drawings, materials lists, cutting lists, bolt lists, welding schedules and QC schedules, based on the design drawing furnished to him and in accordance with the approved schedule. It is highlighted that structural steel members, dimensions thereof indicated in tender drawings are tentative only and may be modified during final design stage.

C. Results of any tests, as and when conducted and as required by the Engineer in charge.

D. Manufacturer's mill test reports in respect of steel materials, bolts, nuts and electrodes, wires as may be applicable.

E. A detailed list of all constructional Plant & Equipment, such as cranes, derricks, winches, welding sets etc. their makes, model, present condition and location, available to the contractor and the ones he will employ on the job to maintain the progress of work in accordance with the contract.

F. The total number of experienced personnel of each category, like fitters, welders, riggers etc., which he intends to deploy on the project.

G. The contractor shall submit complete design calculations for any alternative sections proposed by him for approval of the Engineer in charge. Use of any alternative section shall be subject to approval of the Engineer in charge. However, no extra payment will be entertained on account of this except as specified in schedule of quantities.

1.7 MATERIALS :

1.7.1 STEEL SUPPLIED BY THE CONTRACTOR:

1.7.1.1 The Contractor shall furnish to the Engineer in charge all mill orders covering the material ordered by him for this work and also the test reports received from the Mills for his approval and information. It is not intended that all the steel materials to be supplied by the Contractor for the work shall be specially purchased from the rolling mills. The Contractor's stock material may be used, provided the mill test reports identified with the materials, satisfactorily demonstrate the specified grade and quality. The Engineer in charge shall have the right to test random samples to prove authenticity of the test certificates produced by the Contractor, at the Contractor's cost.

1.7.1.2 All steel materials supplied by the Contractor shall be in a sound condition, of recent manufacture, free from defects, loose mill scale, slag intrusions, laminations, pitting, flaky rust, etc. and be of full weight and thickness specified.

1.7.1.3 Wherever the Contractor, in order to accommodate his other materials in stock, desires to substitute structural steels or plates for the sizes shown on drawings, such substitutions shall be made only after authorization in writing by the Engineer in charge.

1.7.1.4 The Engineer in charge may direct that substitution be made, when he considers such substitution is necessary.

1.7.2 HANDLING AND STORAGE:

1.7.2.1 Proper storage of steel (sections and fabricated members) at the job site shall be the responsibility of the Contractor.

1.7.2.2 Structural steel shall be stored out of mud and dirt. Proper drainage of the storage area shall be provided. These shall be protected from damage or soiling by adjacent construction operations.

1.7.2.3 Fabricated steel shall not be handled until the paint has thoroughly dried. Care shall be taken to avoid paint abrasions and other damage. Teel work shall be transported in such a way so as not to over stress the fabricated sections. All pieces bent or otherwise damaged shall be rejected and shall be replaced by the contractor at his own cost.

1.7.2.4 Checking and inspection of fabricated structural steel work by the Engineer in charge shall be done at various stages of completion of fabrication work. The contractor is required to ensure that fabricated steel work is properly stacked such that all joints of all members are either visible or accessible for inspection at all stages of inspection work. Care should also be taken to ensure that fabricated members are not subjected to stresses due to defective stacking.

1.7.3 FABRICATION:

1.7.3.1 All fabrication work shall be done in accordance with IS: 800: 2007 read in conjunction with relevant codes mentioned therein.

1.7.3.2 Fabrication shall be done in workshops approved by Engineer in charge, unless specifically permitted by Engineer in charge that fabrication can be done at site. Under such circumstances work shall be done on a specially designed and constructed platform. Location, size, specification and construction of such a platform shall have prior approval of Engineer in charge. Loads associated with such platforms shall be provided to Engineer in charge.

1.7.3.3 Mild steel rolled sections and plates shall be cut by shearing/machining and grinding the surfaces to true sizes and shapes. Gas cutting of mild steel may be permitted by the Engineer in charge, provided that every cut face and edge is smoothened by grinding operation. Prior approval of Engineer in charge must be obtained for using gas-cutting techniques either by mechanized gas cutters or manually operated gas cutters. While, using gas-cutting methods, proper allowance must be made for grinding to bring the cut piece to exact required dimensions.

1.7.3.4 Extensive use of templates shall be made in doing fabrication work. Templates shall be clean and should have true surfaces prepared for every successive use. Reinforcements for the structural steel members if required shall be included. In case actual members are used as templates for similar pieces are fit to be incorporated in the finished structure. Jigs and manipulators shall be used, where practicable, and shall be designed to facilitate welding and to ensure that all welds are easily accessible to the operators.

1.7.3.5 All material shall be straight and free from twist and bends unless required to be curvilinear in from. If necessary the material shall be straightened and / or flattened/straightened by pressure. Heating of rolled sections and plates for purpose of straightening shall not be permitted.

1.7.3.6 Curvilinear members shall be formed by bending with the help of pneumatic press. Final shaping, to a very limited extent, however, may be done by local heat application. This shall be done only on receiving approval from the Engineer in charge.

1.7.4 HOLING:

1.7.4.1 All holes shall be made at right angles to the surface of the member. Holes shall be clean cut without any torn or jagged edges. Holes shall be done by drilling. Punching shall not be resorted to, unless previously approved by the Engineer. In any case, punching of holes in materials having a thickness in excess of the connector diameter, or, for materials thicker than 16mm, the hole shall be punched 3mm less in diameter than the required size and then reamed to the full size. Holes shall not be formed or enlarged by burning or gas cutting under any circumstances.

1.7.5 WELDING:

1.7.5.1 GENERAL:

In general only Automatic submerged arc welding will be used for fabrication. Subject to approval of Engineer in charge, Metal inert gas welding may be done for sort length where access to the location of the weld does not permit submerged arc welding. The welding and the welded work shall conform to IS:816, unless otherwise specified. As much work as possible shall be welded in shops and the layout and sequence of operations shall be so arranged as to eliminate distortion and shrinkage stresses. Unless otherwise specified all weld shall be for full contact for all sides.

1.7.5.2 Electrodes for shielded-arc manual welds shall comply with the requirements of IS: 814 and shall be amenable to radiographic tests and shall be of approved make. The electrodes for manual arc welding shall be suitable for use in the position and type of work, as laid down in the above specifications and as recommended by the manufacturers. Electrodes classification group 1 or 2 as given in IS: 814 shall be used for welding steel conforming to IS:2062. Electrodes shall conform to IS-1442 for steel conforming to IS: 8500. Joints in materials above 20mm thick, and, all important connections shall be made with low hydrogen electrodes Electrode flux covering shall be sound and unbroken. Broken or damaged coating shall cause the electrodes to be discarded. Covered electrodes for manual arc-welding shall be properly stored in an oven prior to use in a manner recommended by the Manufacturer and only an hour's quota shall be issued to each welder from the oven.

1.7.5.3 Electrodes larger than 5mm diameter shall not be used for root-runs in butt-welds. Welding plant and accessories shall have capacity adequate for the welding procedure laid down and shall satisfy appropriate standards and be of approved make and quality, the Contractor shall maintain all welding plant in good working order. All the electrical plant in connection with the welding operation shall be properly and adequately earthed and adequate means of measuring the current shall be provided.

1.7.5.4 All welds shall be made only by welders and welding operators who have been properly trained and previously qualified by tests to perform the type of work required as prescribed in the relevant applicable standards.

1.7.5.5 All welds shall be free from defects like below holes, slag inclusions, lack of penetration, undercutting, cracks etc. All welds shall be cleaned of slag or flux and show uniform sections, smoothness of weld metal, feather edges without overlap and freedom from porosity.

1.7.5.6 Fusion faces and surfaces adjacent to the joint for a distance of at least 50mm on either side shall be absolutely free from grease, paint loose scales, moisture or any other substance which might interfere with welding or adversely affect the quality of the weld. Joint surfaces shall be smooth, uniform and free from fins, tears, laminations etc. Preparation of fusion faces shall be done in accordance with the approved fabrication drawings by shearing, chipping, machining or machine flame cutting except that shearing shall not be used for thickness over 8mm

1.7.5.7 In the fabrication of cover-plated beams and built up members all shop splices in each component part shall be made before such component part is welded to other parts of the member. Wherever weld re-enforcement interferes with proper fit-up between components to be assembled for welding, these welds shall be ground flush prior to assembly.

1.7.5.8 Members to be joined by fillet welding shall be brought and held a close together as possible and in no event shall be separated by more than 3mm. If the separation is 1.5mm or greater, the fillet weld size shall be increased by the amount of separation. This shall only apply in the case of continuous welds. The fit-up of joints at contact surfaces which are not completely sealed by welds shall be close enough to exclude water after painting.

1.7.5.9 The separation between fraying surfaces of lap joints and butt joints with backing plate shall not exceed 1.5mm. Abutting parts to be butt welded shall be carefully aligned and the correct root gap maintained throughout the welding operation. Misalignments greater than 25 percent of the thickness of the thinner plate or 3mm whichever is smaller shall be corrected and in making the correction the parts shall not be drawn into a slope sharper than 2 degree (1in 27.5)

1.7.5.10 Welding procedures recommended by appropriate welding standards and known to provide satisfactory welds shall be followed. A welding procedure shall be prepared by the Contractor and submitted to the Engineer in charge for approval before start of welding.

1.7.5.11 Approval of the welding procedure by the Engineer in charge shall not relieve the Contractor of his responsibility for correct and sound welding without undue distortion in the finished structure.

1.7.5.12 Voltage and current (and polarity if direct current is used) shall be set according to the recommendations of the Manufacturer of the electrode being used, and suitable to thickness of material, joint from etc. The work shall be positioned for flat welding wherever practicable and overhead weld shall be avoided.

1.7.5.13 No Welding shall be done when the surface of the members is wet, not during periods of high wind unless the welding operator and the work are properly protected. In joints connected by fillet welds, the minimum sizes of single run fillet welds or first runs and minimum full sizes of fillet welds shall conform to the requirements of IS:816 and IS:823, Fillet welds larger than 8mm shall be made with two or more passes.

1.7.5.14 All ‘full penetration butt welds’ made by manual arc-welding, except when produced with the aid of backing material or welded in flat position, from both sides in square-edge material, not over 8mm thick with root opening not less than one-half the thickness of the thinner part joined, shall have the root of the initial layer gouged out on the back side before welding is started from that side, and shall be so welded as to secure sound metal and complete fusion throughout the entire cross section.

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

1.7.5.16 Each layer of a multiple layer weld except root and surface runs may be moderately peeled with light blows from a blunt tool. Care shall be exercised to prevent scaling or flaking of weld and base metal from over-peeling.

1.7.5.17 Before commencing fabricating of a member or structure in which welding is likely to result in distortion and/or locked up stresses, a complete programme of fabrication, assembly and welding shall be made and submitted to the Engineer in charge for his approval. Such a programme shall, include, besides other appropriate details, full particulars in regard to the following:-

i) Proposed pre-bending of components such as flanges and presetting of joints to offset expected distortion.

ii) Make up of sub-assemblies proposed to be welded before incorporation in final assembly.

iii) Proposed joint forms, classification of wire and flux or covered electrodes, welding process including fitting and welding sequence with directions in which freedom of movement is to be allowed.

iv) Proposed number, spacing and type of strong details of jigs and fixtures for maintaining proper fit up and alignment during welding.

v) Any other special features like assembling similar members back to back or stress relief.

Suggestive minimum preheating of metals:-

Thickness of thickest part at point of welding	Minimum Preheat & Inter pass Temperature			
	Other than low-hydrogen welding electrodes		Low Hydrogen welding electrodes	
	IS:226 steel or IS: 2062 steel	IS: 961 steel	IS:226 steel or IS: 2062 steel	IS:961
Up to 20 mm incl.	None	Welding with this process not allowed	None	10 Dig C
Over 20mm to 40 mm incl.	65º C		10º C	65º C
Over 40mm to 63 mm incl.	110º C		95º C	110º C
Over 63 mm.	150º C		110º C	150º C

Minimum pre heat temperature for metal thickness up to 50 mm shall be 10ºC.

1.7.5.18 If so desired by the Engineer in charge, mock up welding shall be carried out at the contractor's cost to establish the efficacy of the proposed programme, with any modification suggested by the Engineer in charge in limiting distortion or/and residual stress to acceptable levels. Such modifications will not relieve the contractor of any of his responsibilities.

1.7.5.19 The ends of butt joints shall be welded so as to provide full throat thickness. This may be done by the use of extension pieces, cross-runs or other approved means. The weld face shall, at all places, be deposited projecting the surface of the parent metal. Where a flush surface is required, the surplus metal shall be dressed off. Splices and butt joints of compression members, depending on contact for stress transmission, shall be accurately machined over the whole section. In column bases, the ends of shafts together with the attached gussets, angles, channels etc., after bolting and/or welding together as the case may be, shall be accurately machined so that the parts connected butt over the entire surface of contact. Care shall be taken that connecting angles or channels are fixed with such accuracy that they are not reduced in thickness by machining by more than 0.80mm.

1.7.5.20 The minimum leg length of a fillet weld as deposited shall be not less than the specified size. In no case shall a concave weld be deposited, unless specifically permitted. Where permitted, the leg length shall be increased above that specified length, so that the resultant throat thickness is as great as would have been obtained by the deposition of a flat-faced weld of the specified leg length.

1.7.5.21 After making each run of welding, all slag shall be thoroughly removed and the surface cleaned. The weld metal, as deposited (including tack welds), shall be free from cracks, slag inclusions, porosity, cavities and other deposition faults. The weld metal shall be properly fused with the parent metal without under cutting or overlapping at the toes of the weld. The surface of the weld shall have a uniform consistent contour and regular appearance.

1.7.6 INSPECTION OF WELDS:

All welds shall be inspected for flaws by any of the methods described in these Specifications, and as per IS: 822. The choice of the method to be adopted, shall be determined by the Engineer in charge.

The contractor shall arrange for all tests as called for, at his own cost.

In case the tests uncover defective work, such tests shall be at the Contractor's cost and the Contactor shall correct such defects at his own cost and prove the soundness of rectified work.

The correction of defective welds shall be carried out as directed by the Engineer in charge without damaging the parent metal. When a crack in the weld is removed, magnetic particle inspection or any other equally positive means as prescribed by the Engineer in charge shall be used to ensure that the whole of the crack and material up to 25mm beyond each end of the crack has been removed. Cost of all such tests and operations incidental to correction shall be to the Contractor's account.

1.7.7 FABRICATION TOLERANCES:

1.7.7.1 Unless otherwise shown on drawings, the fabrication tolerances shall generally be as detailed hereunder.

1.7.8 STRAIGHTNESS:

1.7.8.1 The dimensional and weight tolerance for rolled shapes shall be in accordance with IS: 1852 for indigenous steel and equivalent applicable codes for imported steel. The acceptable limits for straightness (sweep and camber) fro rolled or fabricated members shall be:-

Struts and columns: L/1000 or 10mm whichever is smaller. For all other members not primarily in compression such as purlins, beams, bracings & web members of trusses and latticed girders: L/500 or 15mm whichever is less.(Where L is the length of finished member, or such lesser length as the Engineer in charge may specify).

1.7.9 TWISTS:

1.7.9.1 A limit of twist (prior to erection) in:-

Box girders and heavy columns:	L/1500
Other members	L/1000

1.7.10 CAMBER:

1.7.10.1 Tolerance in specified camber of structural members shall be ±3mm.

1.7.11 LENGTH:

1.7.11.1 Tolerance in specified length shall be as follows:-

Type of member	Tolerance
A column finished for contact bearing	: ± 1 mm
Other members (e.g. beams) under 10 m	: + 0 and -3mm
Other members (e.g. beams) 10 m long and over	: + 0 and -5mm

1.7.12 SQUARE-NESS AT END OF MEMBERS:

1.7.12.1.1 Beam to beam and beam to column connections where the abutting parts are to be joined by butt welds, permissible deviation from the square-ness of the end is:-

Beams up to 600mm in depth: 1.5mm

Beams over 600mm in depth : 1.5mm every 600 mm depth up to a max of 3mm

1.7.12.1.2 Where abutting parts are to be joined by bolting through cleats or end plates, the connections require closer tolerance.

Beams up to 600mm in depth: 1.0mm

Beams over 600mm in depth : max of 1.5mm

1.7.16 BUTT JOINTS:

For full bearing, two abutting ends of columns shall first be aligned to within 1 in 1000 of their combined length and then the following conditions shall be met:

(a) Over at least 80% of the bearing surface the clearance between the surfaces does not exceed 0.10mm.

(b) Over the reminder of the surfaces the clearance between the surfaces does not exceed 0.30mm.

Where web stiffeners are designed for full bearing on either the top flange or bottom flange or both, at least half the stiffener shall be in positive contact with the flange. The reminder of the contact face could have a max. gap of 0.25mm.

1.7.17 DEPTH OF MEMBER:

1.7.17.1 Acceptable deviation from the specified overall depth is:

For depths of 900 mm and under:	± 3mm.
For depths over 900 mm and under 1800mm:	± 5mm
For depths of 1800 mm and over:	+8 mm: - 5mm

1.7.18 WEB PLATES:

1.7.18.1 Acceptable deviation from flatness in girder webs in the length between the stiffeners or in a length equal to the girder depth shall be $1/150^{th}$ of the total web depth.

1.7.19 FLANGE PLATES:

1.7.19.1 Limit for combined warp-age and tilt on the flanges of a built up member is 1/200 of the total width of flange or 1.5 mm whichever is smaller measured with respect to centre line of flange.

1.7.19.2 Lateral deviation between centre line of web plate and centre line of flange plate at contact surfaces, in the case of built up sections shall not exceed 3 mm.

1.7.20 INSPECTION:

1.7.20.1 The contractor shall give due notice to the Engineer in charge in advance if the materials or workmanship getting ready for inspection.

1.7.20.2 All rejected material shall be promptly removed from the shop and replaced with new material for the Engineer in charge's approval / inspection. The fact that certain material has been accepted at the Contractor's shop shall not invalidate final rejection at site by the Engineer in charge, if it fails to be in proper conditioner has fabrication in accuracies which prevents proper assembly. No materials shall be painted or dispatched to site without inspection and approval by the Engineer in charge unless, such inspection is waived in writing by the Engineer in charge.

1.7.20.3 Shop inspection by the Engineer in charge or his authorized representative, or submission of test certificates and acceptance thereof by the Engineer, shall not relieve the Contractor from the responsibility of furnishing material conforming to the requirements of these specifications. Nor shall it invalidate any claim, which the Engineer in charge may make because of defective or unsatisfactory material and/or workmanship.

1.7.20.4 The Contractor shall provide all the testing and inspection services and facilities for shop work except where otherwise specified. For fabrication work carried out in the field, the same standard of supervision and quality control shall be maintained as in shop fabricated work. Inspection and testing shall be conducted in a manner satisfactory to the Engineer in charge.

1.7.20.5 **Column Fabrication Tolerances**: The work point at about the elevation of the crane girders seat shall not be vary more than ±1/8th inch from the straight line struck between top and bottom points. The AWS straightness tolerances will control between the work points. The girder seat plates are to be located from the work centre line with a tolerance of ±1/32 inch.

1.7.20.6 **Crane Runway Girder Fabrication tolerances**:

Crane Girders: Horizontal sweeps in crane runway girders shall not exceed 1/4th inch per 50 feet length of girder span. Camber shall not exceed ± 1/4th inch per 50 feet girder span over that indicated on the design drawing.

Girder ends: The ends of the girder supported by the columns, the bottom flange shall be flat and perpendicular to the web. The flatness tolerance shall be ±1/32 inch at any point supported by the column cap plates.

Girder Depth: The depth of crane girder shall be detailed and fabricated to a "KEEP" at their ends of ±1/32 inch by use of a variable thickness sole plate.

Crane Girder alignment: The centre line top of each crane girder at each column shall be aligned horizontally within ±1/4th inch of the theoretical base lines both sides of the runway.

1.7.21 TESTING:

1.7.21.1 MATERIAL TESTING:

If mill test reports are not available for any steel materials, the same shall be got tested by the contractor to the satisfaction of Engineer in charge to demonstrate conformity with the relevant specification.

1.7.22 TESTS ON WELDS:

1.7.22.1 MAGNETIC PARTICLE TEST:

Only where the Engineer in charge requires that flaw-detection of welds be done by 'magnetic particle test', in such cases the tests are to be done in accordance with IS:3703. if heat treatment is performed, the completed weld shall be examined after the heat treatment. All defects shall be repaired and re-tested. Magnetic particle tests shall be carried out using alternating current. Direct current may be used with the explicit written permission of the Engineer in charge.

1.7.23 DYE PENETRATION TEST:

Where welds are required to be examined by dye penetration inspection method, such tests shall be carried out in accordance with IS:3658.

1.7.24 RADIOGRAPHIC INSPECTION:

Whether instructed by Engineer in charge, or not, all 'Butt' welds shall be inspected by radiographic examination method. Such examination shall be done in accordance with the recommendations of IS:1182.

1.7.25 TEST FAILURE:

At any stage, in the event of any material or work failing to meet an inspection of test requirement, which is not overseen by the Engineer in charge, the Contractor shall notify the Engineer in charge immediately. The contractor must obtain permission from Engineer in charge before repair is undertaken. The quality control procedures to be followed to ensure satisfactory repair shall be subject to approval by the Engineer in charge. The Engineer in charge has the right to specify additional inspection or testing as he deems necessary, and the additional cost of such testing shall be borne by the Contractor. The Contractor shall maintain records of all inspection and testing which shall be made available to the Engineer in charge on demand.

1.7.26 SHOP MATCHING:

Some steel work, particularly columns along with tie beams, bracings etc. may have to be shop assembled to ensure satisfactory fabrication, if the Engineer in charge so desires, he may order such assembly at shop for verification. The Contractor shall comply with such instructions without claiming any extra cost.

1.7.27 SHOP ASSEMBLY:

1.7.27.1 Steel work shall be temporarily shop assembled, as necessary, so that the accuracy of fit may be checked before dispatch. The parts shall be shop assembled with a sufficient number of parallel drifts to bring and keep the parts in place.

1.7.27.2 Since parts drilled or punched, with templates having steel bushes shall be similar and, as such, interchangeable, such steel work may be shop erected in part only, as agreed by the Engineer in charge.

1.7.28 ASSEMBLY:

1.7.28.1 All parts assembled for bolting shall be in close contact over the whole surface.

1.7.28.2 The component parts shall be so assembled that they are neither twisted nor otherwise damaged, specified cambers, if any, shall be provided.

1.7.28.3 All parts of bolted and welded members shall be held firmly in position by means of jigs or clamps while bolting or welding. No drifting of holes shall be permitted, except to draw the parts together and no drift used shall be larger than the nominal diameter of the bolt. Drifting done during assembling shall not distort the metal or enlarge the holes.

1.7.28.4 Trial assemblies shall be carried out at the fabrication stage to ensure accuracy of workmanship, and these checks shall be witnessed by the Engineer in charge/Authorized inspecting agency. Such trial assembly shall be at the cost of the contractor.

1.7.29 FIELD BOLTS:

1. Requirements stipulated under bolting shall apply for field bolts also. Field bolts nuts and washers shall be furnished by the contractor in excess of the nominal numbers required. He shall supply the full number of bolts, nuts and washers and other necessary fittings required completing the work, together with the additional bolts, nuts and washers totaling to 10% of the requirement subject to minimum of 10 Nos.
2. At the time of assembly, the surfaces in contact shall be free of paint or any other applied finish, oil, dirt, loose rust, loose scale, burrs and other defects which would prevent solid seating or the parts or would interfere with the development of friction between them.

3. If any other surface condition, including a machined surface, is specified, it shall be the responsibility of the Contractor to work within the slip factor specified for the particular case.

4. Each bolt and nut shall be assembled with washers of appropriate shape, quality and number in cases where plane parallel surfaces are involved, such washers shall be placed under the bolt head or the nut, whichever is to be rotated during the tightening operation. The rotated nut or bolt head shall be tightened against a surface normal to the bolt axis, and the appropriate tapered washer shall be used when the surfaces are not parallel. The angle between the bolt axis and the surface under the non-rotating component (i.e. the bolt head or the nut) shall be 90+3 degree. For angles outside these limits, a tapered washer shall be placed under the non-rotating component. Tapered washers shall be correctly positioned.

5. No gasket or other flexible material shall be placed between the holes. The holes in parts to be joined shall be sufficiently well aligned to permit bolts to be freely placed in position. Driving of bolts is not permitted. The nuts shall be placed so that the identification marks are clearly visible after tightening. Nut and bolts shall always be tightened in a staggered pattern and where there are more than four bolts in anyone joint, they shall be tightened from the centre of the joint outwards.

6. If after final tightening, a nut or bolt is slackened off for any reason, the bolt, nut and washer or washers shall be discarded and not used again.

1.7.30 MARKING OF MEMBERS:

1.7.30.1 After checking and inspection, all members shall be marked for identification during erection. This mark shall correspond to distinguishing marks on approved erection drawings and shall be legibly painted and stamped on it. The erection mark shall be stamped with a metal dye with figures at least 20mm high and to such optimum depth as to be clearly visible, even after a member is galvanized.

1.7.30.2 All erection marks shall be on thee outer surface of all sections and near one end, but clear of bolt-holes. The marking shall be so stamped that they are easily discernible when sorting out members. The stamped marking shall be encircled boldly by a distinguishable paint to facilitate easy location. Erection marks on like pieces shall be at identical location. Members having lengths of 7.0m or more shall have the erection mark at both ends.

1.7.30.3 Each fabricated member, whether assembled prior dispatch or not so assembled, shall bear an erection mark, which will help to identify the member and its position in respect of the whole structure, to facilitate re-erection at site. This erection mark shall be incorporated in the shop detail and erection drawings.

1.7.31 ERRORS:

Any error in shop work which prevents proper assembling and fitting up of parts in the field by moderate use of drift pins or moderate amount of reaming will be classified by the Engineer in charge as defective workmanship. All charges incurred by the Engineer either directly or indirectly because of the poor workmanship will be deducted from the amount due to the contractor before payment is made. The amount of such deduction will consist of the sum total of the costs of labour direct or indirect, material, plant, transportation, equipment rental and overhead expenses. In case the Engineer chooses to reject the material because of poor workmanship, the cost of all handling and returning the material to the contractor, if he so desires, shall entirely be the contractors account. All the replacement materials shall be supplied free and in all such cases, the cost of handling, transport and delivery to site shall be borne by the contractor.

1.7.32 ERECTION:

1.7.32.1 Erection of structural steel fabricated components shall be done generally in accordance with provisions of IS 800.-2007

1.7.32.2 Before starting of erection work, the contractor shall ensure the fulfillment of the following activities:-

a) The contractor shall submit, for examination by the Engineer in charge, detailed particulars of his proposed methods of erection of the superstructure steel work, together with complete calculations relating to strength and deflection, if the erection scheme necessitates the attachment of strength steel work to the permanent steel work, the contractor shall submit, for approval of the Engineer in charge, the methods he proposes for making good the permanent steelwork after removing the temporary work. The contractor shall also submit the design and fabrication drawings including detailed calculations of temporary nose, counter weight all temporary support, staging, braces etc. required for safe erection, for approval of the Engineer in charge.

b) The contractor shall provide all construction and transport equipment, tools, tackle and consumables, materials, labour and supervision required for the erection of the structural steel work.

c) Handing, assembling, bolting, welding and satisfactory installation of all fabricated structural steel materials in proper location, according to approved erection drawings and/or as directed by the Engineer in charge.

d) Setting out, aligning, plumbing, leveling, bolting, welding and securely fixing the fabricated steel structures in accordance with the erection scheme or as directed by the Engineer in charge.

1.7.33 ERECTION TOLERANCES:

Erection tolerances shall be as per table-33 OF IS 800-2007

1.7.34 QUALITY CONTROL & TESTING REQUIREMENTS:

1.7.34.1 The contractor shall submit the following:

- ❖ Proposed overall schedule for documentation of shop drawings, plan/procedures and records, submission of procedure of fabrication.
- ❖ The contractor shall himself inspect all materials and shop work to satisfy the specified tolerance limits and quality norms before the same are inspected by Engineer in charge.

1.7.34.2 The contractor shall through appropriate planning and continuous measurements in the workshop and the erection at site ensure that the tolerances specified in this specification are strictly adhered to.

1.7.34.3 Fabricating agency shall have in house facilities for all testing of weld.

1.7.35 VISUAL EXAMINATION:

The contractor shall conduct visual examination and measurement of the external dimensions of welds for all joints. Before examining the welded joints, areas close to it on both sides of the weld for a width not less than 20 mm shall be cleaned of slag and other impurities. Examination shall be done by a magnifying glass which has a magnification power of ten (10) and measuring instrument which has an accuracy of ± 0.10 mm or by weld gauges. Welded joints shall be examined from both sides. The contractor shall examine the following during the visual checks.

i) Correctness and shape of the welded joints

ii) Incomplete penetration of weld metal

iii) Influx

iv) Burns

v) Un welded craters

vi) Undercuts

vii) Cracks in welded spots and heat affected zones

viii) Porosity in welds and spot welds.

ix) Compression in welded joints as a result of electrode impact while carrying out contact welding

x) Displacement of welded element.

The contractor shall, document all data as per sound practices.

1.7.35 In order to exercise proper control of the quality of the welding, contractor shall enforce methods of control as tabulated below:

Purpose	Control subjects	Methods of control
1	2	3
1. Control of welding materials and basic metal quality	Quality control of electrodes, welding wire, flux and protective gases.	Weldability test to determine the technological properties of materials. Mechanical test of weld metal. Metallographic investigations of welds macro-structure and microstructure. Checking of weld metal resistance for inter-crystalline corrosion. Study if weld metal solidity by physical control methods.
2. Checking of welders qualifications	Welding of specimens for quality determination.	Mechanical tests, metal graphical investigation & checking of welded joints by physical control methods
3. Control of welded joint quality	Control of assembly accuracy and technological welding process.	Checking of assembly quality & centering of welded members. Checking of welding equipment conditions. Checking corrective ness of welding procedure. Visual examination of welds.

SECTION- F

MATERIAL & PAINTING SPECIFICATIONS

1.0 MATERIAL

1.1 SPECIFICATIONS

1.1.1 Primary members fabricated from plates and sections with minimum yield strength of 345 Mpa or to suit design by continuous welding.

1.1.2 Secondary members for Purlins and Grits shall conform to the physical specification of ASTM A570 (Grade 50) or equivalent IS Standards having a minimum yield strength of 345 MPa. The minimum thickness of secondary members shall be 2.5mm.

1.1.3 Rod /ANGLE bracing shall conform to the physical specification IS 2062.OF MIN 245MPA YIELD STRENGTH

1.1.4 All hot rolled sections shall conform to the physical specifications IS 2062. All other miscellaneous secondary members shall have minimum yield strength of 250 MPa.

1.2 DESCRIPTION

1.2.1 **PRIMARY MEMBERS :**

Primary structural framing shall include the transverse rigid frames, columns, corner columns, end wall wind columns and crane gantry girders and Frames at Door openings.

1.2.2 **SECONDARY MEMBERS** :

Secondary structural framing shall include the purlins, girts, eave struts, wind bracing, flange bracing, base angles, clips,flashings and other miscellaneous structural parts. Suitable wind bracings sag rods to be reckoned while designing the structure.

1.2.2 **PURLINS:**

Purlins should be of Pre Galvanised steel of 345 Mpa having a coating thickness of 275 gsm

1.2.4. **ROOF SHEETING :**

Roof panels shall be made out of 26 gauge high tensile steel CLIP-ON profiled sheets having min. yield strength of 550 Mpa conforming to ASTM-A446 with galvalume coating to AZ-150 bare galvalume, as per ASTM A-792-AZ to make TCT of 0.47mm. The profile shall be trapezoidal shaped to satisfy the loading requirements or any other profile if proved to have sufficient strength to take DL, LL ,wind loads. Standing seam sheet shall be of 345 MPa

1.2.5 **Wall Panels**

Wall panel material specifications shall be same as roof panels. They shall be polyester coated of approved standard colour.0.5 TCT The profile shall have a maximum pitch of 200mm and minimum depth of 26 mm. Alternatively maximum pitch of 333mm with two intermediate stiffening ribs will be acceptable or any other profile if proved to have sufficient strength to take the relevant wind loads.

1.2.6 **SHEETING FASTENERS**:

Standard fasteners shall be self tapping zinc plated metal screws with EPDM bonded zinc plated washers. All screws shall be color coated to match roof and wall sheeting.

1.2.7 **SEALER**:

This is to be applied at all side laps and end laps of roof panels and around self flashing windows. Sealer shall be pressure sensitive elastomeric Butyl tapes. The sealer shall be non-asphaltic, non-shrinking and non toxic and shall be superior adhesive metals, plastics and painted at temperatures from 51°C to +104°C.

1.2.8 **CLOSURES**:

Solid or closed cell closures matching the profiles of the panel shall be installed along the eaves, rake and other locations specified on drawings.

1.2.9 **FLASHING AND TRIM:**

Flashing and / or trim shall be furnished at the rake, corners, eaves, and framed openings and wherever necessary to provide weather tightness and finished appearance. Color shall be matching with the color of wall. Material shall be 26 gauge thick conforming to the physical specifications of sheeting.

1.2.10 SKY LIGHTS :

Skylight is translucent corrugated sheets matching the profile of Roof. The translucent sheets are made from 2mm thick Polycarbonate sheets and shall provide an economic form of general-purpose day lighting. Skylights shall be provided for 3% of the roof area. Colour of the panel shall be white with smooth surface finish with a light transmitting capacity of 60% $\pm$ 5%.

1.2.11 GUTTERS AND DOWN SPOUTS:

FRP lined Gutters and downspouts shall be adequately designed to ensure proper roof drainage system. Material shall be same as that of sheeting.

1.3 **CONNECTIONS :**

1.3.1 SITE CONNECTIONS

a) All primary bolted connections shall be provided with galvanized high strength bolts, washers, nuts conforming to specifications of grade 8.8 OF IS 1367

b) All secondary bolted connections shall be furnished with bolts, nuts, washers conforming to the specifications of grade 4.6 of IS 1367 or ASTM-A307.

1.3.2 SHOP CONNECTIONS

All shop connections shall be welded with appropriate arc welding process and welding shall be in accordance with IS 816,IS-819 ,IS1024,IS-1261 ,IS1323,IS-9595, AWSD 1.1. as appropriate. The Webs should be welded on to the flanges at both the faces at top and bottom for columns, beams and crane girders. Weld material should have strength more than the parent metal.

1.4 ROOF & WALL BRACINGS

Roof and wall bracings shall have a minimum yield strength of 250 Mpa and shall conform to the specifications IS 2062.

Portal Bracings connecting columns should be min. at two places on both the side walls @ 50m. c/c.

1.5 **PAINTING FOR STRUCTURAL STEEL WORK**:

The cleaning & painting specifications for the Structural Steel work shall be as below

a) Sandblasting / shot blasting to Sa 2 ½ .
b) Two shop coats of red oxide zinc phosphate primer (1 x 40 µ)
c) Two site coats of epoxy finish paint (2 x 40 µ)

The colour of the finish paint shall be approved by the client.

SPECIAL CONDITIONS OF CONTRACT

STRUCTURAL STEEL WORKS

1. The contractor will be required to submit the necessary test certificates for the materials so supplied for use on this work.

2. Based on the detailed shop Drawings approved by the BHEL the Contractor shall prepare at his cost, the Drawing Office Despatch Lists (abbreviated as D.O.D.L.'s) and get them approved by BHEL. These shall contain the drawing number, the designation of items, number of pieces, based on the section weights as adopted for supply of raw materials without deduction for bolt holes and skew cuts. The DOD Lists shall form the basis for payment.

3. a) Fabrication shall generally be in accordance with IS 800 (latest issue) entitled "Code of practice for use of structural steel in general building constructions". Welding shall be in accordance with IS 816 entitled "Code of practice for use of metal arc welding for general construction in mild steel". The contractor shall provide necessary splicing as approved by the Engineer-in-charge, to suit the available lengths of raw steel, and no extra amount shall be paid on this account. Any specifications not covered by the Relevant Indian Standard Codes of practice shall be in accordance with the relevant BS or in its absence in accordance with the well established standard Engineering practice to be acceptable to BHEL.

   b) Under the contract, where site fabrication is to be adopted, a suitable site near and inside the factory premises will be made available by BHEL at free of ground rent. The Contractor shall provide all plant and equipments, tools covered sheds and other facilities required for site fabrication work at his own cost.

4. All fabricated steel work shall be given one coat of Red Oxide / Zinc Chromate primer conforming to Relevant IS code and shall be match marked suitably to facilitate their erection in position without any difficulty.

5. Normally no night work will be permitted. But in case of emergency and urgent in nature where night work is warranted, the Contractor shall arrange for night works providing all facilities including illumination at his own cost, after obtaining written permission from Engineer-in-charge under intimation to Security and Safety Departments.

6. The contractor shall submit schedules showing the programme and order in which the Contractor proposes to carry out the fabrication and erection works with dates and estimated completion times for various portions of the work. Such schedules shall be approved by the Engineer-in-charge prior to the starting of the relevant works.

7. BHEL would expect the contractor to take up simultaneously wherever possible both fabrication and erection of structures especially where a good deal of assembly work, which is in fact a continuation of the fabrication work, is required to be done at site. The painting and cloaking items of works, wherever possible, should be done simultaneously to save time. The Contractor may with the prior approval of BHEL sublet the work. The main contractor shall however, be responsible for all works executed on his behalf by the sub-contractors.

8. SETTING OUT AND ERECTING OF STEEL WORK:

a) Erection of steel work shall generally be in accordance with the provision of IS 800 (Code of practice for use of structural steel in General Constructions).

b) Site assembly of members on the ground by bolting or otherwise as specified in shall be inspected thoroughly by the Engineer-in-charge, or his authorized representative and approved before erection.

c) All equipments, facilities and consumables for site fabrication as well as erection plant requirement, etc., such as derricks, cranes, lifting tackles, wire ropes, chain pulley blocks, jacks, winches etc. as necessary shall be arranged for by the Contractor at his own cost. Care shall be taken to see that all equipments, tools and tackles and wire ropes etc. in use are always in good working conditions and fit for use. For all the tools and plants periodical calibration certificate from approved agency should be obtained. **The above lists should be enclosed along with the tender.**

d) Frames shall be lifted at such points that they will not buckle or deform. Trusses shall be lifted only at nodes. Temporary bracing shall, if required, be provided at no extra cost, to relieve erection stresses.

e) In the case of trusses and similar roof structures all or atleast a majority of the purlins and wind bracings, shall be erected side by side with the erection of these structures. Columns shall be erected true to plumb, (no screed bars provided and fixed by the Contractor over the prepared pedestals), true to center line, level and gauge of traveling cranes. Alignment of the columns, crane girders and rails shall be done very carefully using high precision survey instruments and necessary adjustments made to suit actual requirements. **A list of survey instruments proposed to be used shall be furnished in the tender.**

f) All damages to the steel work caused during the transit or otherwise shall be made good to the full satisfaction of BHEL at Contractor's own cost, before erection.

g) It shall be the sole responsibility of the Contractor to ensure accuracy of level, plumb, span and alignment of steel work before erection of other components.

9. **PAINTING AFTER ERECTION:**

a) All steel work shall be given two coats of approved brands of first quality synthetic enamel ready mixed paint / epoxy paint as the case may be. (over the priming coat already provided). The shade, make, quality and other particulars of the paint proposed to be used, shall be subject to prior approval by BHEL.

10. **TIME ALLOWED (Period of Contract)**

The following programme should be strictly followed.

1	Design and issue of approved column foundation (pedestal) drawing	Within three weeks from the date of LOI
2	Design and issue of holding down bolts	Progressively from the completion of first month of issue of LOI to suit uninterrupted progress by Civil contractor
3	Design, fabrication and supply of PEB components including accessories.	Progressively within 12 weeks of approval of drawing.
4	Painting and erection of PEB including roofing, side cladding and all accessories as in scope	Progressively within 12 weeks of receipt of first consignment at site

11. The contractor will have to provide and fix the necessary screed bars etc. at his own cost in proper line, level and position to facilitate the erection work. Further, the contractor should lay and maintain necessary temporary approaches within his working areas at his own cost to facilitate his work and for easy movement of vehicles, cranes etc. deployed on the work. Only reasonable areas will be provided by BHEL.

12. Till the expiry of the maintenance period of ONE YEAR after the completion of the entire contract work and handing over to BHEL, the contractor should retain the minimum equipments and staff required and should carry out the maintenance works with the least possible interference to the routine works of the new shop. Till the expiry of the maintenance period the contractor shall be responsible for all damages occurring due to any fault on his part or on the part of his workmen, sub-contractor or other agencies engaged by him.

13. BHEL shall have the right to take possession of or use any completed or partially completed part of the work. Such possession or use shall not be deemed to be acceptance of any work not in accordance with the contract.

14. The contractor shall observe all safety regulations and take necessary safety precautions as called for under the Factories Act or other relevant statute as applicable including the use of safety boots, safety belts, helmets and other equipments and accessories for ensuring safe execution of the contract and freedom from accidents.

15. The Contractor should co-operate with other contractors who may be executing their work in the same area in order to facilitate efficient execution of the entire project work in this area.

16. The Guarantee / Warranty period for this contract shall be ONE YEAR from the date of completion of the entire work and handing over to BHEL. During this period the successful tenderer shall be at site on his own expense for replacement or repair of all defects arising out of faulty materials and/or workmanship.

17. Further particulars relating to design, fabrication and clarifications, if any, may be obtained on reference to the Sr. Dy.General Manager/Civil / Township, BHEL, Tiruchirapalli-14 or his nominee.

18. The contractor shall engage a level-II NDT Inspector for inspection of NDT works.

19. Inspection will be done by BHEL Staff/Agencies appointed by BHEL for the works covered in the tender.

20. Painting, DFT of primer should be 25 micron.

21. Finish coat Painting, DFT 20 micron for each coat. Paint shall be of first quality product of approved brand.

22. Pre heating and post heating required shall be as per AWS (latest).

23. Welder qualification is to be done before commencement of the work and approved & qualified welder only shall be engaged in work. Necessary testing charges shall be borne by the contractor.

24. For the supply of material the manufacturer's test certificate is to be produced.

25. The contractor shall submit material tallying statement on completion of the work indicating the details of quantities of material received, used for the work as per DODL, quantity returned in full length, useful cut bits and scrap.

a	Single recovery rate for the non returned scrap upto 5%age of actual consumption:	Rs. 40,290 / MT + applicable taxes at the time of recovery
b	Same as above but for Crane rail	Landed cost + applicable taxes at the time of recovery
c	Punitive recovery rate for steel quantity not accounted and extra scrap generated beyond 5% of actual consumption.	Rs. 80,580 / MT + applicable taxes at the time of recovery
d	Same as above but for Crane rail	Double the landed cost + applicable taxes at the time of recovery

GENERAL QUALITY CONTROL PROCEDURE FOR STRUCTURAL STEEL WORKS

The following quality standards are required to be maintained in all the structural steel fabrication components.

1. All the raw materials will be generally conform to IS 2062-1999 or equivalent.
2. The welding electrodes shall be kept in oven only.
3. a)Submerged Arc welding has to be done for crane girder flange to web joints and built up column as per the details given in the approved drawings.

   b)E7018 Welding electrode rods shall be used where the thickness of plates are 20mm and more and as specified in the drawings issued.

   . c)All the other weld in crane girder and butt welds in columns and beams shall be done with E 7018 welding electrodes.

   . d)All the welds in Nodal points of trusses and lattice girders shall be done with E 7018 welding electrodes.

4. Pre heating shall be done for plates having thickness 25mm & more and the temperature shall be maintained by checking with thermal chalk, as per quality standards.
5. All erection welding, of any component shall be done using E 7018 Welding Electrode.
6. 100% visual check shall be carried out for raw materials and welding on all components and the welding areas during inspection, to be tested for LPI / MPI / UT / Radiography / PWHT as provided in the Quality Control Procedure.
7. Base plate to column shall be perfectly checked for perpendicularity.
8. All the components shall be checked for dimension at fit-up stage itself before the commencement of welding operation.
9. Contractor shall buy & use Black Hex. bolts and nuts as per IS Specifications as detailed below for fabrication & erection of steel structures.

Black Hex Bolts	IS 1363 -	1984 Part – I (Class 5.6/5.8)
Black Hex Nuts	IS 1363 -	1984 Part - III
Plain MS washer	IS 2016 -	1975
Taper washer for beams	IS 5274 -	1975
Taper washer for channel	IS 5372 -	1975
Spring washer	IS 3063 -	1964

10. Contractor shall buy & use the following welding consumables as detailed below:

a)

SMAW No.	Electrodes	Manufacturer
1.	E 6013 & E 7018	D & H Secheron
2.	E 6013 & E 7018	ESAB India Ltd.
3.	E 6013 & E 7018	Modi Arc Electrode Co.
4.	E 6013 & E 7018	D & H Welding Electrode (I) Ltd.
5.	E 6013 & E 7018	Mantek Electrods (P) Ltd.
6.	E 6013 & E 7018	Ador Welding Ltd.
7.	E 6013 & E 7018	Varun Electrodes Pvt. Ltd.

b) SAW Wire

Sl.No.	Brand	Manufacturer
1.	AUTO melt Grade A	Ador Welding
2.	Mantek Grade A	Mantek Wires
3.	Metaspool S1 dia. 4mm	Precision Wires
4.	OK Aut Rod 12.08 L	ESAB India Ltd.

c) Flux

Sl.No.	Brand	Manufacturer
1.	Super S41	Super Elec Inds
2.	Mantek 22	Mantek Welded Flux Co.
3.	RMH Auto Weld Grade 1	RMH Chemicals
4.	SWP 40 T	Super Weld Prod

d) GMAW (Co2)

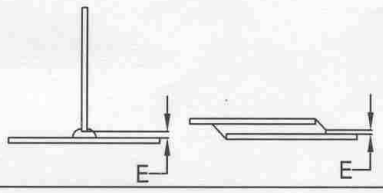
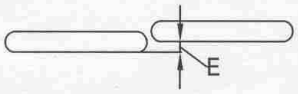
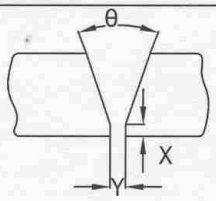
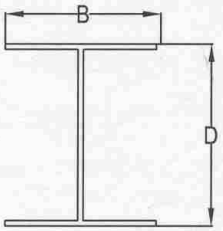
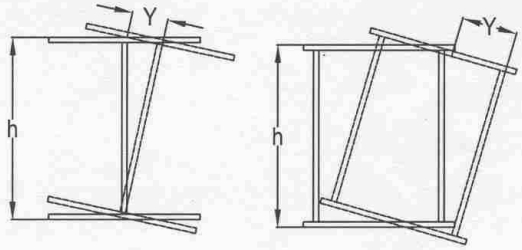
Electrode	Brand	Manufacturer
ER70S-6 Co2 WIRE	Automig-1	Ador Welding Ltd.
ER70S-6 Co2 WIRE	Esab MW1	Esab India Ltd., Chennai
ER70S-6 Co2 WIRE	Mantek Mig	Mantek Wiress
ER70S-6 Co2 WIRE	Nouvarc	Nouveax Industries (P) Ltd., Kangayam
ER70S-6 Co2 WIRE	Autofil-6	Voltrac Electrode Pvt. Ltd., Tirupathi.
ER70S-6 Co2 WIRE	Prima Mig/Mag	Varun Electrodes Pvt. Ltd., Panipat.

11. Rolled steel sections of depth greater than 450mm need to be visually checked for lamination before the process of fabrication. The doubtful area to be tested for LPI and if lamination is found UT Test to be carried-out.

12. The welding code of practice, procedures, specifications for electrodes / consumables etc., for manual welding and auto welding shall conform to AWS D1.1/D1.1M:2006 (Latest) and as per the QCP issued by BHEL component-wise.

13. All the fabrication and erection works shall have to be executed as per the QCP approved by BHEL.

14. All the fabrication and erection works will be inspected for Quality Control by a third party inspection agency as fixed by BHEL.

DESIGNATION	DETAIL OF SKETCH	PERMISSIBLE DEVIATION
FILLET WELD FIT UP	FIG:2 	MAX.LOCALISED GAP =1.5mm
BUTT WELD	FIG:3 	CUT OF ALIGNMENT = 3 mm MAX
FIT UP	FIG:4 	FOR ,X ,Y, θ REFER =1.2 &3 OF CL 7:4:3
SECTION SIZE	FIG:5 	D: UPTO 1M : ± 3mm 1M TO 2M : ± 4.5mm OVER 2M : + 7.5 mm - 4.5mm B:±3mm
TWIST ON SECTION (Y)		Y=0.005h 10 mm MAX

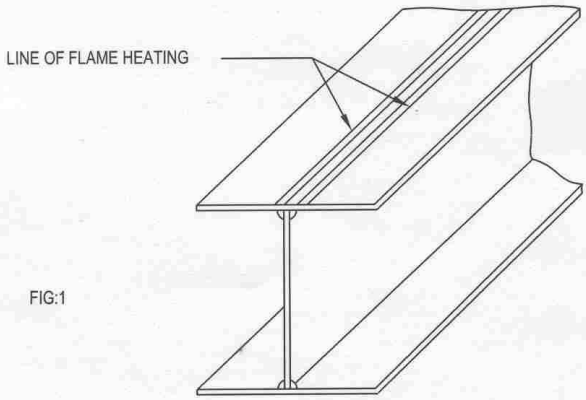
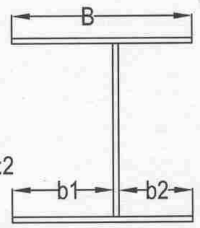
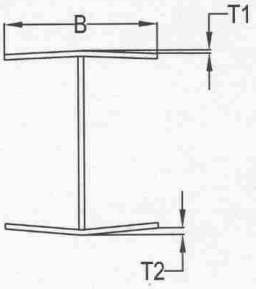
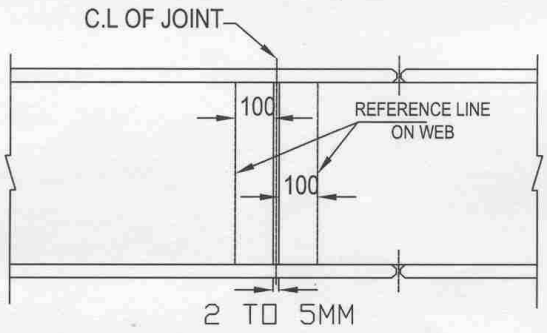


FIG:1

CORRECTION OF FLANGE WARPAGE

DESIGNATION	DETAIL OF SKETCH	PERMISSIBLE DEVIATION
WEB SHIFT	 FIG:2	$\frac{b1 - b2}{2} = 2mm$
FLANGE WARPAGE	 FIG:3	$T1+T2 = \frac{B}{100}$ OR 6MM



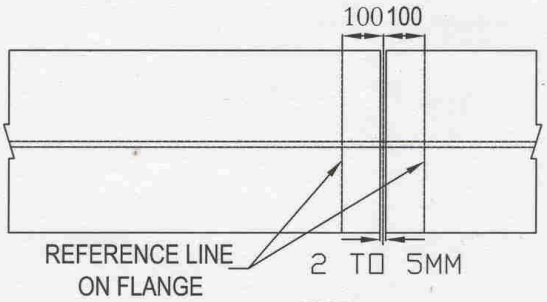
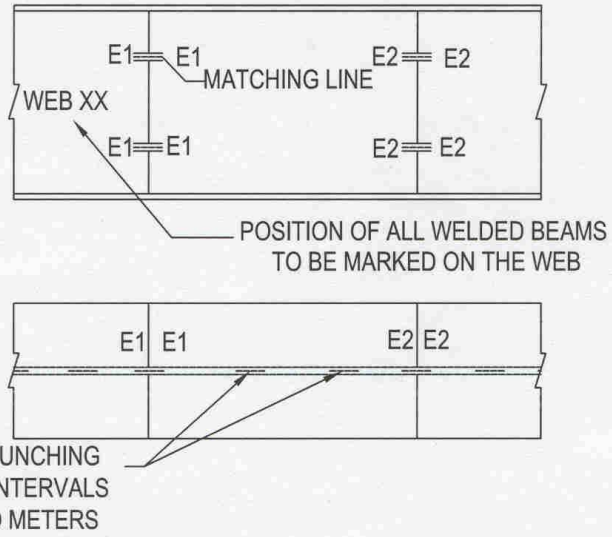
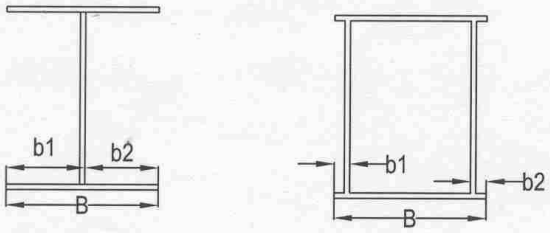
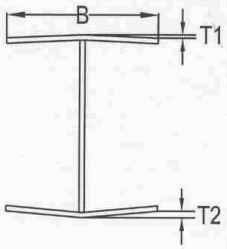
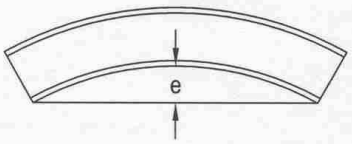
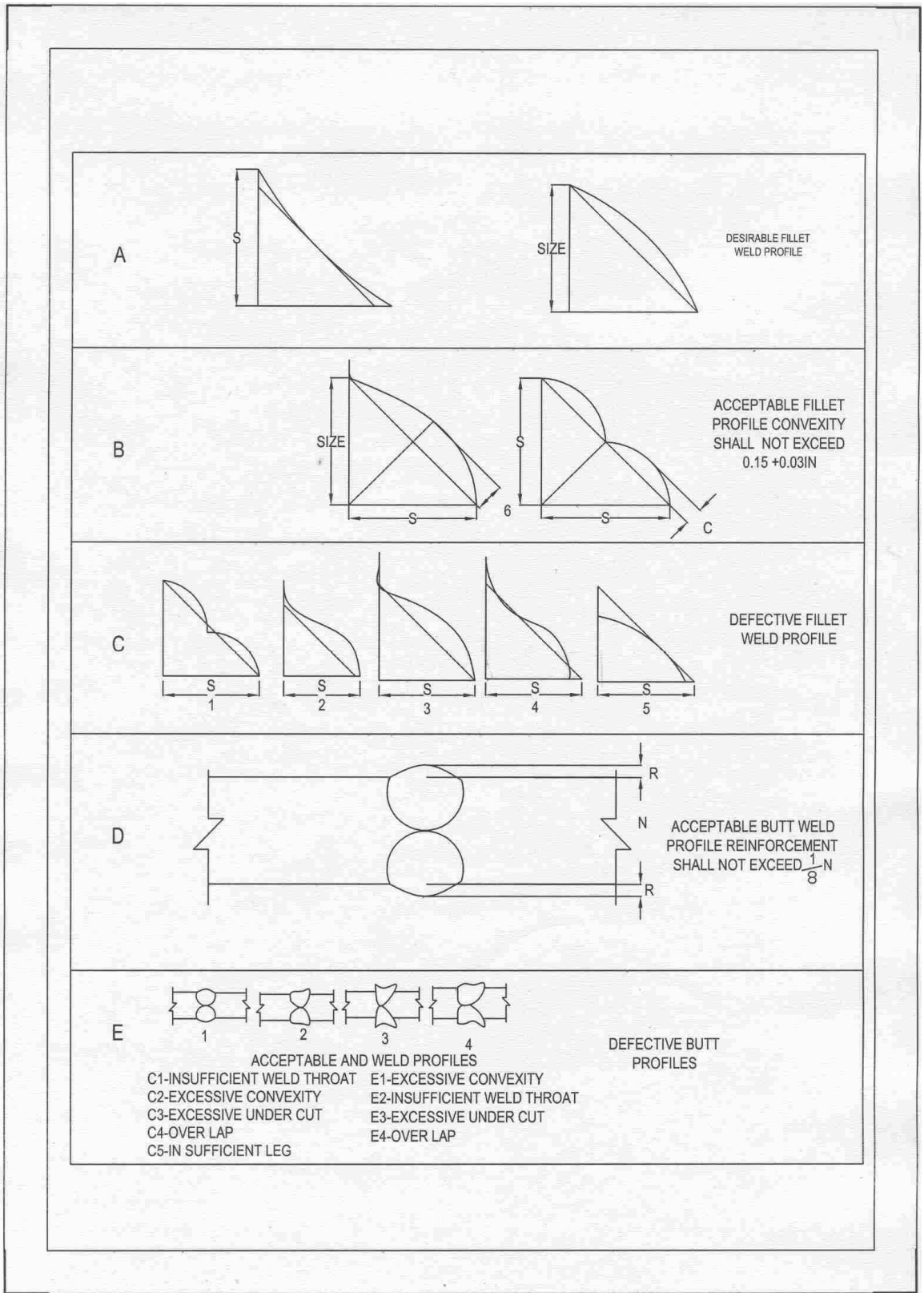


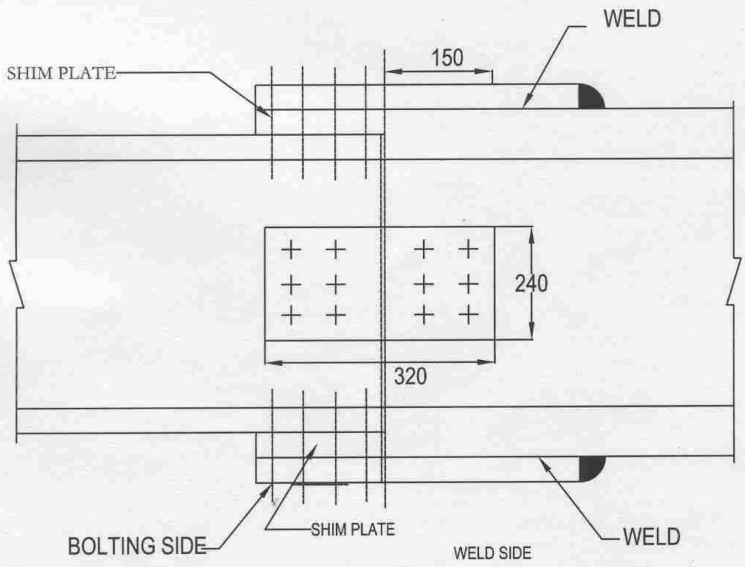
FIG:4

FIG:5 MATCH MARKING [GIRDER-5]

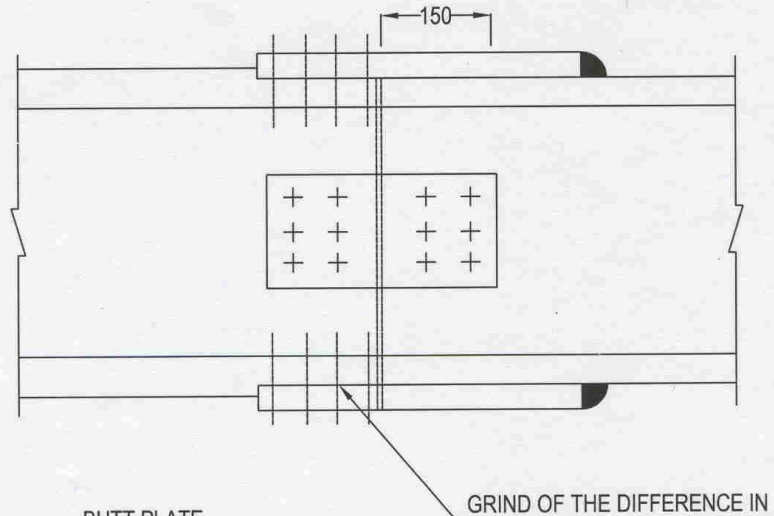


DESIGNATION	DETAIL OF SKETCH	PERMISSIBLE DEVIATION
WEB SHIFT	FIGURE-7 	$\frac{b1 - b2}{2}$ = 2mm MAX
FLANGE WARPAGE	FIGURE-8 	$T1+T2 = \frac{B}{100}$ OR 6MM
CAMBER	FIGURE-9 	E = 1/1000 x length SUBJECT TO MAX] OF 10mm.


A
S
SIZE
DESIRABLE FILLET
WELD PROFILE
B
SIZE
S
6
S
S
C
ACCEPTABLE FILLET
PROFILE CONVEXITY
SHALL NOT EXCEED
0.15 +0.03IN
C
S
1
S
2
S
3
S
4
S
5
DEFECTIVE FILLET
WELD PROFILE
D
R
N
R
ACCEPTABLE BUTT WELD
PROFILE REINFORCEMENT
SHALL NOT EXCEED 1/8 N
E
1
2
3
4
DEFECTIVE BUTT
PROFILES
ACCEPTABLE AND WELD PROFILES
C1-INSUFFICIENT WELD THROAT
C2-EXCESSIVE CONVEXITY
C3-EXCESSIVE UNDER CUT
C4-OVER LAP
C5-IN SUFFICIENT LEG
E1-EXCESSIVE CONVEXITY
E2-INSUFFICIENT WELD THROAT
E3-EXCESSIVE UNDER CUT
E4-OVER LAP



WHEN BOLTING SIDE IS OF
LOWER SECTION USE SHIMS



BUTT PLATE
WHEN BOLTING
SIDE IS OF
HIGHER SECTION

BOLTED TYPE COLUMNS
(W.F.SECTION)

GENERAL CONDITIONS

1. No night work will be permitted without the written permission of the Engineer – in – charge.

2. Items of work other than those mentioned in the Bill of Quantities (Tender Schedule) attached hereto will be carried out at the rates to be fixed by this organization as per relevant clauses of the General Conditions of Contract.

3. The Contractor will have to make his own arrangements for water & compressed air without any extra claims.

   On the written request from the contractor **Electrical energy required for the work may be given by this organization at any one point at the site of work at chargeable basis.** The approximate power requirement shall have to be indicated while submitting the tender. BHEL does not accept any liability whatsoever for non-supply, delay in supply or failure of supply of electrical energy. Contractor shall ensure that there is no wastage of electrical energy otherwise supply is liable to be stopped at contractor's risk and cost. The contractor shall make leak proof / fire proof shed and provide control panel board of required capacity and lay the required cables at their own cost for further distribution.

4. Permission for erection of temporary work sheds etc., at site will have to be obtained from BHEL in writing in advance.

5. The works contract to be entered into with the successful tenderer will be governed by the BHEL revised General Conditions of Contract in force.

6. The successful tenderer / Contractor shall observe all safety regulations and take necessary safety precaution as called for under the "BHEL General Conditions of Contract and Safety Precautions" enclosed herewith.

7. In all matters of dispute, the decision of the General Manager, Bharat Heavy Electricals Ltd., Tiruchirappalli – 620 014. shall be final and binding on the tenderer / contractor.

8. All the materials to be used in the work and nature of work shall conform to respective TNBP, IS and National Buildings Organisation Standard Specifications and shall be got approved by the Engineer – in – charge before actual incorporation in the work

9. All materials brought by the Contractor for incorporation in the work shall be got inspected and approved by the Engineer-in-charge before they are incorporated in the work

10. The Manager / Civil or his duly authorized representative shall have all reasonable times access to Contractor's premises of work and shall have the power at all the reasonable times to inspect and test any portion of the work or examine the materials and workmanship of the structures during their manufacture and test. The contractor shall give due notice in writing to the Inspecting Engineer of BHEL when the materials supplied to be incorporated in the work are ready for Inspection and test. No material shall be incorporated in the work until the inspecting Engineer certified in writing that such materials have been inspected and approved by him.

11. The contractor should submit in advance every fortnight a detailed programme of work to be undertaken from time to time strictly in conformities with the "Time and Progress Chart" covering the entire constructed work and reschedule them wherever necessary during the progress of the work so as to achieve the target set.

12. The contractor should extend full co-operation to the other contractors who may be doing other works in the same areas to enable them to execute their portions of work without any delay or difficulty.

GENERAL SAFETY PRECAUTIONS TO BE FOLLOWED AT WORK SITE DURING EXECUTION

The following safety measures should be strictly adhered to during execution of works at sites.

1. Providing the working platform with toe board and handrail for continuous working at heights.
2. Providing safety belt and life line at all times for men working at heights.
3. Providing dust or fume respirator in places where dust and fume concentration exists.
4. Providing goggles and welding screens.
5. Providing acid and alkali proof rubber gloves for handling acid and alkali and chemical which are corrosive.
6. Providing rubber gloves for working on electrical works.
7. Ensuring proper lashing of the components while being transported in vehicles.
8. The vehicles must have side supports or have body to support the materials conveyed.
9. The materials should not be allowed to extend or overflow the sides of the vehicles.
10. Materials should not be allowed to overhang from the rear edge of the body of the vehicle.
11. Driver of the vehicle must possess license.
12. Vehicle must not be overloaded prescribed limits.
13. Red flags and lights for parts projecting from the body of vehicle must be provided.
14. The speed restrictions within the factory premises must be strictly adhered to.
15. The gas cylinders must be always handled on trolleys or kept tied down not in use. They should never be rolled as Roller for conveying.
16. Cylinders should not be used without regulators.
17. All excavations must be barricaded and red lamps must be provided.
18. All electrical connections must be properly earthed.
19. No work should be taken up for execution inside shop floor, without obtaining necessary work permit.
20. Providing helmet, safety belt, etc., for high level work and sufficient number of Industrial Safety nets at appropriate level to safeguard the persons working at high level particularly nin trusses, girders, roofing etc., of industrial and high roof buildings.
21. The contractor should maintain a register regarding the driver license particulars.
22. All personal protective equipment conform with standard specification as per the details given in the code of conduct.

Contractor including their sub contractors, agents and labour engaged on the work are required to scrupulously adhere to the safety regulations, safety precautions and measurers. Any violation thereof will invite punitive action being taken against them. Also contractors with frequent violations of safety regulations will not be entrusted with further work in this organization.

SAFETY PRECAUTIONS TO BE OBSERVED WHILE TRANSPORTING MATERIALS

I. VEHICLE

1. Vehicles carrying material should have proper registration documents and must be produced on demand by our Security Staff.

2. The light on right side, i.e., over the drivers cabin shall be in working condition.

3. Both the head lights as well as park lamps must be in working conditions.

II. MOVEMENT OF VEHICLE

1. The vehicle should not travel at more than 20 km.ph in our premises.

2. The Driver of the vehicle must possess heavy duty licence and produce on demand by the Security Staff.

3. Vehicles carrying inflammable liquids in the tank containers should have grounding chain or the tank should be coated with insulating material also to avoid Static Electricity.

4. In road junctions, speed breakers and railway crossing, the speed should be lowered and vehicle should proceed cautiously.

5. The driving should 'KEEP TO THE LEFT' at all places.

6. The vehicle should not be parked in road which could obstruct the vehicular traffic.

7. No person other than driver should be allowed to sit or stand on the prime mover or trailer.

8. The vehicle should pass only through the approved routes. Short cuts should be forbidden.

9. There must be a safe distance behind another moving truck.

10. The driver should avoid making quick starts, jerky stops or quick turns at excessive speed.

III SHIPPING

1. Strong side supports should be provided on both sides of the trailer. The side supports should be fixed in such a way that it cannot be removed even temporarily.

2. Adequate packing must be given for easy slinging operation. The packing materials should be good enough to withstand the load.

3. The stacking of loads in the truck should be evenly placed. The load should not be heaped together or dumped over the chassis.

4. The loaded materials should be fastened tightly with 'WIRE ROPE'. Manila rope or coir rope should not at all be used. There must be side packing such as gunny or rubber tyre between the sharp edge of the job and wire rope in order to avoid cut in the wire rope.

5. There must be minimum two fastenings and it should be more in case of lengthier loads.

6. The wire rope should be in sound conditions i.e, there should not be links, knots or bristles etc.,

7. The wire rope ends should be clamped with 'U' clamps.

8. The load on the truck should not be beyond its standard capacity. The carrying capacity must be clearly marked on the trailer also.

9. The loose pieces should be bundled before loading on the truck.

10. There must be red flags or red lamps for the lengthy loads which extend beyond chassis.

11. The load should not be over hanging more than 3 ft. from the end of the body.

12. The materials should not be stacked too high to avoid hitting against live electric lines.

13. While transporting the scraps, there must be wire knitting cover to prevent falling of scrap.

IV GENERAL

The vehicles should not be moved directly inside the production building in case the materials are to be unloaded there. But the vehicle should be parked outside the building and the driver should ascertain the passage as well as the unloading points with the help of shop officials. This will avoid the congestion of blocking of traffic in the gangway.

TERMS AND CONDITIONS REGARDING COMPLIANCE WITH VARIOUS LABOUR LAWS BY THE CONTRACTORS FOR BHEL

1. The Contractor shall not employ in connection with the work any person who has not completed 18 years of age.

2. The Contractor shall in respect of labour employed by him either directly or through subcontractors, comply with or cause to be complied with the following statutory provisions and rules and in regard to all matters provided therein.

   a) The Contract Labour (Regulation & Abolition) Act 1970 and the related Tamil Nadu Rules.
   b) The Minimum Wages Act 1948 and the related Tamil Nadu Rules.
   c) The Payment of Wages Act 1936 and the related Tamil Nadu Rules.
   d) The Factories Act 1948 and the related Tamil Nadu Rules.
   e) The Employee's Provident Fund & Miscellaneous Provisions Act 1952.
   f) The Workmen Compensation Act 1923.
   g) The Industrial Disputes Act 1947.

   and any other law or modifications to the above or to the Rules made thereunder from time to time.

REGISTRATION AND LICENSING

3. Every Contractor shall register his name with the Welfare Section of BHEL before taking up the work awarded to him by giving the following information and getting a Code Number :

   a) The Name of the Contractor
   b) Nature of Contract Work
   c) Period of work
   d) Number of maximum labour employed by him on any one day
   e) License No. & Date (Applicable in case of contractor employing 20 or more workers)
   f) Whether enrolled for PF, ESI, etc., and enrolment No.

   This information is called for, for the purpose of informing the Inspectorate of Factories whenever they call for information regarding contracts.

4. The Contractor employing 20 or more workmen is required to obtain license from the authorities (The Deputy Chief Inspector of Factories / Assistant Commissioner of Labour as the case may be). The license shall be amended and / or renewed wherever, there is an increase in the workmen employed by him or in the event of contract being extended or renewed. The Contractor shall inform the licence number to the BHEL Management before taking up the work.

5. The Contractor (Licensed or unlicensed) shall promptly furnish every information and document required by BHEL authorities for the purpose of fulfilling their obligations as Principal Employer and / or Occupier of the Factory and shall render all necessary assistance for the same.

WAGES

6. The Contractor shall pay wages to the workmen employed by him at the rate which shall not be less than the minimum wages applicable under Law from time to time.

7. The Contractor shall fix wage periods in respect of which wages shall be payable. No wage period shall exceed one month.

8. The Contractor shall ensure payment of wages to the contract labour employed by him within three days from the end of wage period in case the wage period is one week or a fortnight and in all other cases before 10th day of the following month.

9. All Payment of wages shall be made on working days at the work site and during the working time and on date notified in advance. In case the work is completed before the expiry of the wage period final payment shall be made within 48 hours of the last working day.

10. Where the employment of any worker is terminated by or on behalf of the Contractor, the wages earned by him shall be paid before the expiry of the second working day from the day on which his employment is terminated.

11. Wages due to every worker shall be paid to him direct or to the person authorized by him in this behalf. All wages shall be paid in current coin or currency in both.

12. The Contractor shall ensure the disbursement of wages in the presence of such authorized representative of BHEL Management.

13. The above payment shall be verified by the authorized officer / representative of BHEL with the following certificate of the payment sheet "Certified that the amount shown in Column No…… has been paid to the workmen concerned in my presence on ……..at…….

14. A certificate of payment shall be furnished in duplicate by the Contractor to the Engineer in charge each month in Form 'A'.

15. A notice showing the wage period and the place and time of disbursement of wages shall be displayed at the place of work and a copy to be sent to the Welfare Department by the Contractor under acknowledgement.

16. Notices showing the rate of wages, weekly rest days, hours of work, wage period, date of payment of wages, names and addresses of the Inspector having jurisdiction, the date of unpaid wages shall be displayed in Tamil and English in conspicuous places at the establishment and at work site by the Contractor. The Contractor shall inform the BHEL Management every month the details of contract labour engaged for contract in this following form :

a) Serial Number
b) Location
c) Period of work
d) No. of contract labour engaged during the month
e) No. of days worked
f) No. of men worked
g) Wages paid to workers

The above statement shall be furnished to BHEL Management at the end of every month.

REGISTERS AND RECORDS AND COLLECTION OF STATISTICS

17. The following documents / formats under Contract Labour (Regulation & Abolition) Act 1970 and Tamil Nadu Rules thereunder shall be maintained by each contractor.

    a) Register of persons employed by the Contractor
    b) Employment Card
    c) Service Certificate
    d) Muster Roll, Wage Register, Deduction Register, Wage slip, Overtime Register, Register of Fines, Register of Advances etc.,

18. The Contractor shall display the abstract of the Contract Labour (Regulation&Abolition) Act and the Rules thereunder both in English and Tamil.

19. Half yearly Return shall be sent by the Contractor in duplicate to the Licensing Officer.

20. The Contractor shall submit the returns required under the Contract Labour (Regulation & Abolition) Act 1970 periodically to BHEL Management.

21. The Contractor shall without fail give upto date information in writing of the attendance of the workers employed by him.

22. The Contractor shall ensure that his workers keep and produce their Employment Card when coming to duty and take them back when leaving duty.

23. All the above registers and records shall be preserved in original for a period of three years. All the registers, records and notice maintained under the Act and rules shall be produced on demand by Inspector or any authority under the Act.

WORKING HOURS AND WORKING CONDITIONS

24. No worker shall be required or allowed to work on Sunday unless he has or will have a holiday on anyone of the three days before or after the said day.

25. The Contractor shall inform BHEL Management in the prescribed form details of the contract workers scheduled to work on Sunday, the day of rest and also indicate the substituted holiday in lieu thereof. This shall be intimated two days in advance before his workmen are booked for work on Sunday.

26. The contract labour working for more than nine hours in any day or for more than 48 hours in any week shall be paid wages at the rate of twice the ordinary rate of wages in accordance with the provisions of Sections 59 of the Factories Act 1948.

27. The Contractor shall provide all safety devices and personal protective equipment to his workmen at his own cost and shall ensure that his workmen wear / use such devices or equipment provided to them while doing the work and there should not be any relaxation on this.

28. The Contractor shall give four paid National Holidays to his workers, viz., 26th January, 1st May, 15th August and 2nd October.

29. The Contractor shall ensure that his workmen vacate the premises after the shift is over.

30. The Contractor shall give leave with wages to his workmen who have worked for a period of 240 days or more in the Factory premises during a calendar year. This leave shall be allowed during the subsequent calendar year at the rate of one day for every 20 days of work performed by the worker during the previous calendar year. The worker whose services commences on a day other than the first of January shall be entitled to leave with wages at the above rate (One day for every 20 days of work) only if he had worked for a minimum of 2 /3 of the total number of days in the reminder of the calendar year. This leave will be admissible only during the subsequent calendar year.

31. No woman worker shall be required or allowed to work in the Factory except between the hours of 6.00 A.M. and 7.00 P.M.

32. The Contractor shall comply with the provisions relating to Welfare and Health facilities as provided in the Contract Labour (Regulation and Abolition) Act 1970 read with the Tamil Nadu Contract Labour Rules 1975.

NOTICE OF ACCIDENTS

33. Notwithstanding anything contrary to this, in the event of accident the contractor shall be required to fill injury report and submit the Engineer in charge immediately and ensure the compliances of ESI / Workmen's compensation Act, Factories Act and Rules made thereunder. He shall also maintain a register of accident as per the Act.

34. The Contractor shall get the contract labour engaged by him insured under Workmen's Compensation policy from General Insurance Corporation of India before actually starting the work of contract. The insurance coverage should be for the entire period of Contract. The Contract shall comply with the provisions of the Workmen's Compensation Act 1923. (This should be read in conjunction with the provisions of ESI Act)

COVERAGE UNDER THE ESI ACT / PF AND MISCELLANEOUS PROVISIONS ACT

35. The contractor shall ensure that all his workmen are covered under the Employee's State Insurance Act and produce to BHEL such Registration Number / Enrolment Number before executing the contract work.

36. The Contractor shall regularly pay the amount of contribution. i.e., employer's contributions as well as employees' contribution pursuance of the above scheme as fixed from time to time. The Contribution payable presently is 1.75% wages to be recovered from his workmen and 4.75% of wages to b e contributed by the Contractor. Contributions recovered from employee and contribution made by the contractor may be rounded to the next higher multiples of five paise.

37. The Contractor shall take note of any amendment that may be brought forth in the above contribution rate and act accordingly.

38. The contractor shall ensure that his workmen are covered under the EPF & Miscellaneous Provisions Act 1952 and accordingly produce to the BHEL Management the registration / enrolment number before awarding of contract work. As per the existing provisions every worker shall be entitled and required to become a member of the fund. The employee's contribution payable at present is 12% of wages which will be recovered by the contractor from the wages of his workmen and the contractor should pay equal contribution. The contractor is also liable to pay any administrative charges in this behalf that may be decided from time to time. It will be the responsibility of the contractor to ensure such contribution payable in respect of workmen employed through sub-contractors also.

39. The Contractor shall take note of any amendment in the rate of contribution payable under the scheme from time to time.

40. The Contractor shall within seven days of the close of every month submit to BHEL a statement showing the amount of contribution payable / paid for employees engaged by him or through him and shall also furnish to BHEL such information as Principal Employer is required to furnish under the provisions of the ESI Act and PF as well as the schemes made thereunder to the authorities concerned.

41. Whenever any sum of money is found to be recoverable from or payable by the contractor under the above Act, the sum shall be deducted from any sum that may be due or which at any time thereafter may become due to the Contractor under this contract or under any other contract or from his security deposit. In case the recoveries are not sufficient to satisfy the claim, the contractor shall pay the balance thereof on demand. In case any recoveries are made under this clause from security deposit, the contractor shall immediately thereafter pay such further

sums as may be required to replenish the shortage caused by such recoveries in amount of security deposit.

42. The Contractor shall abide by all the labour and other laws applicable to contract labour / worker under this contract and shall at all times keep BHEL indemnified against all loses, claims, prosecutions under any law.

43. In case of non-compliance of any of the provisions of the Acts and in case BHEL having complied with the same, BHEL will be entitled to recover the same from the contractor / sub-contractor.

44. Non-exercise of any of the powers or rights available to BHEL hereunder or under any law, shall not in any way operate as waiver thereof.

Note : The Specimen forms for the following are available in BHEL.

1)	Form 'A'	-	Payment Certificate
2)	Form IV	-	Application for License
3)	Form XIII	-	Register of Workmen employed by contractor
4)	Form XIV	-	Employment Card
5)	Form XV	-	Service Certificate
6)	Form XVI	-	Muster Roll
7)	Form XVII	-	Register of wages
8)	Form XIX	-	Wage slip

CONTENTS

CHAPTER – IV

VALUATION AND PAYMENT

ANNEXURE

CHAPTER- I

1. DEFINITIONS

In these General Conditions of Contract, the following terms shall have the meaning hereby assigned to them except where the context otherwise requires:-

a) The “CONTRACT” means the documents forming the tender and acceptance thereof, together with all documents referred to therein including General and Special Conditions of Contract, Schedules ‘A’, ‘B’, ‘C’, ‘D’, ‘E’, and / or General Summary attached to the form of tender, the Bharat Heavy Electricals Limited, Schedule of Rates as amended and in force the Specifications and the Drawings. All these documents as applicable taken together shall be deemed to form one Contract and shall be complementary to one another.

b) The “TENDER DOCUMENTS” means the form of Tender the applicable Schedules ‘A’, ‘B’, ‘C’, ‘D’, ‘E’, and / or General Summary, General and Special Conditions of Contract and the Specification and / or Drawings as given to Contractors on payment for the purpose of preparing their tenders.

c) The “WORK” means the work described in the tender documents in individual work orders and/or accompanying Drawings and Specifications as may be issued from time to time to the Contractor by the Engineer–in– charge within the powers conferred upon them, including all modified or additional works and obligations to be carried out either at the site or at any Factory Workshop or other place as required for the performance of the Contract.

d) The “SITE” means the lands and/or other places on, in into or through which the work is to be executed under the Contract or any adjacent land, path or street which may be allotted to or used for the purpose of carrying out the contract.

e) The “CONTRACTOR” means the individual, firm or Company, whether incorporated or not undertaking the work and shall include the legal personal representatives of such individuals or the persons composing the firm or Company, or the successors of the firm or Company and the permitted assigns of such individual or firm or Company.

f) The “ Engineer–in–charge” means the Engineer who is incharge for the works referred.

CHAPTER II

SCOPE OF CONTRACT

2. Heading to the Contract:

The heading to these conditions shall not effect the interpretation thereof.

3. Contract Documents

The Accepting Officer shall furnish to the Contractor on demand "FREE OF COST" three copies of signed drawings and one copy of the signed agreement comprising of preamble to agreement, General and Special Specifications, Schedule 'A', 'B', 'C', & 'E', etc., (but excluding General Conditions of Contract and Drawings) and **three** copies of all further drawings issued during the progress of work.

However, for any additional copies of the agreement or drawings required by the Contractor the same will be supplied on payment at the specified cost.

The Contractor shall keep one copy of all the Drawings and the Specifications at the site and the Engineer-in-charge or his representative shall have access to them at all reasonable times.

None of these documents shall be used by the contractor for any purpose other than that of this contract.

The Contractor shall take necessary steps to ensure that all persons employed on any work in connection with this contract have noticed that the Indian official Secrets Act 1923 (XIX of 1923) applies to them and shall continue so to apply even after the execution of such works under the contract.

4. Works to be Carried Out

The Contract shall, except as provided under Schedules 'B' and 'C' include all labour, materials, tools, plants equipment and transport which may be required in preparation for, and in the entire execution and full completion of the work. Schedule 'A' shall be deemed to have been prepared in accordance with good practice and recognized principles and unless otherwise stated, the descriptions given therein shall be held to include waste on materials carriage and cartage, lead, return of empties, hoisting, setting, fitting in position and all other labour necessary in and for the entire execution and full completion aforesaid. Any error in description or quantity in schedule 'A' or any omission there from shall not vitiate the Contract or release the Contractor from the execution of the whole or any part of the work comprised therein according to the Drawings and Specifications, or from any of his obligations under the Contract. The insertion of the name of any firm of suppliers in the Tender Documents is for the purpose of obtaining a particular class or quality of materials or workmanship but the articles or materials specified may be obtained from any other firm subject to prior written approval of the Engineer – in – charge.

In the case of a discrepancy between Schedule 'A' the specification and / or the Drawing, the Accepting Officer shall be the sole deciding authority as to which shall prevail and his decision shall be final and conclusive. If neither Drawings nor Specifications contain any mention of minor details of construction, which in the opinion of the Accepting Officer whose decision shall be final and conclusive, are reasonable and obviously and fairly intended for the satisfactory completion of the work, such details shall be provided by the Contractor without any extra cost as if they were specially mentioned and shall be deemed to be included in the contract.

The contractor will be deemed to have satisfied himself as to the nature of the site, local facilities of access and all matters affecting the execution and completion of the work. No extra charges consequent on any mis-understanding in these respects or otherwise will be allowed.

5. Provisional Items

The full amount of provisional lumpsums and the value annexed to each provisional item inserted in the tender documents shall be deducted from the contract sum and the value of work ordered and executed thereunder shall be ascertained by measurement or valuation as for deviations.

No work under these items is to be begun without instructions in writing from the Engineer-in-charge.

The extent of quantities or items described as “Provisional” shall not be held to guarantee or limit the amount and description of the work to be executed by the contractor either in respect of the items concerned or the work as a whole.

No addition or deduction shall be made by the Contractor to the amount of the provisional lumpsums as included in the tender documents.

6. Deviations

The contractor shall not make any alteration in addition to or omission from the work as described in the tender documents except in pursuance of the written instructions of the Engineer-in-charge. No such deviation from the work described in the tender documents shall be valid unless the same has been specifically confirmed and accepted by the Accepting Officer in writing and incorporated in the contract.

The Accepting Officer may deviate either by way of addition or deduction, from the work so described, provided that the contract sum be not thereby varied on the whole by more than the percentage set out in the tender documents. The value of all addition and deductions will be added to, or deducted from the contract sum. Whenever the Accepting Officer intends to exercise such a right, his intention shall specify the deviations which are to be made, the lumpsum assessment or the proposed basis of payment, the extra time allowed, if any, and the date for completion of the entire contract.

Any objection by the Contractor to any matter concerning the order shall be notified by him in writing to the Engineer-in-charge within **Seven days** from the date of such order, but under no circumstances shall the work be stopped (unless so ordered by the Engineer-in-charge) owing to differences or controversy that may arise from such an objection. In the absence of such a notification of objection by the contractor, he will be deemed to have accepted the order and the conditions stated therein. In the event of the contractor failing to agree with the Engineer-in charge regarding the terms of the proposed deviation, the objection shall be referred to the Project Manager whose decision shall be final conclusive and binding on the Contractor.

7. Time

Time is the essence of the contract and is specified in the tender document or in each individual Work Order.

As soon as possible after the contract is let or any substantial Work Order is placed and before work under is to begin, the Engineer-in-charge and the Contractor shall agree to a Time and Progress Chart. The Chart shall be prepared in direct relation to the time stated in the Tender Documents or the Work Order for the completion of the individual items there of and/the contract or order as a whole. It shall indicate the forecast of the dates for the commencement of the various trade processes or sequences of the work, and shall be amended as may be required by agreement between the Engineer-in-charge and the Contractor within the limitation of the time imposed in the Tender Documents or Order

In the absence of any specific Time and Progress chart to be agreed to between the Contractor and the Engineer–in–charge, the contractor shall ensure and maintain uninterrupted progress of the work such that the entire work shall be completed within the time imposed in the Tender Documents or Order and that the proportion of work completed upto any time in relation to the entire work to be under the Contractor Order shall not be less than the proportion that the time elapsed bears to the total time of completion provided in the Tender Documents or Order.

The contractor shall suspend the execution of the work, or any part or parts thereof whenever called upon in writing by the Engineer–in–charge to do so, and

shall not resume work thereon until so directed in writing by the Engineer –in–charge. The Contractor will be allowed an extension of time for completion not less than the period of suspension. However, no other claim in this respect for compensation or otherwise however will be admitted. Provided the cause for suspension is not attributable to any default on the contractor's part to proceed with or fulfill the contractual obligations. This may also be extended to allow for alteration of work made by the deviation order.

8. Stores and Materials

The Contractor shall, at his own cost and expense, provide all materials required for the works, other than those listed in Schedule 'B', which are to be supplied by Bharat Heavy Electricals Limited. All materials to be supplied by the Contractor shall be of the best kind as described in the specifications and the Contractor shall, if requested by the Engineer–in–charge, furnish proof to the satisfaction of the Engineer-in-charge, that the materials so comply with the specifications.

The contractor shall, at his own expense and without delay, supply samples of materials proposed to be used in the execution of the work for approval of the Engineer–in–charge, who may reject the materials not corresponding either in quality or character to the approved samples.

In the case of stores provided under Schedule 'B' the Contractor shall bear the cost of loading, transporting to site, unloading, storing under cover as required assembling and jointing the several parts together as necessary and incorporating or fixing these stores materials in the work, including all preparatory work of whatever description as may be required, and of closing, preparing, loading and returning empty cases or containers to the place of issue without any extra charges.

9. Delay and Extension of Time:

if, in the opinion of Engineer–in–charge the work is delayed:

i) by reason of abnormally bad weather, OR

ii) by reason of serious loss or damage by fire, OR

iii) by reason of Civil commotion, local combination of workmen strike or lockout, affecting any of the trades employed on the work OR.

iv) by delay on the part of the agency or tradesman engaged by BHEL in executing work not forming part of this contract, OR

v) by reason of any other cause which in the absolute discretion of the Engineer–in–charge is (when he is the Accepting Officer of the Contract) beyond the Contractor's reasonable control, than in such case the Accepting Officer on the recommendation of the Engineer-in-charge (or higher authority) may make fair and reasonable extension in the completion dates of the individual items of work or the contract as a whole. Such extension which will be communicated to the Contractor by the Engineer–in–charge in writing shall be final and binding on the Contractor. No other claim in this respect for compensation or other–wise howsoever is admissible. Upon the happening of any such event causing delay, the Contractor shall immediately given notice thereof in writing to the Engineer-in-charge but shall nevertheless use constantly his best endeavour to prevent or make good the delay and shall do all that may reasonably be required to the satisfaction of the Engineer–in–charge to proceed with the work.

10. Patent Rights:

The Contractor shall fully indemnify B.H.E.L or the agent, servant, or employee of B.H.E.L against any action, claim or proceeding relating to infringement or the use of any patent or design or any alleged patent or design rights, and shall pay any royalties which may be payable in respect of any article / or part there of included in the contract.

In the event of any claims being made or action brought against B.H.E.L or any agent, or servant or employee of BHEL in respect of matters aforesaid the Contractor shall immediately be notified thereof for taking necessary action provided that payment of indemnity shall not apply when such infringement has taken place in complying with the specific directions issued by the BHEL but the Contractor shall pay any royalties payable in respect of any such use.

11. Octroi and Other Duties:

All charges on account of Octroi, Terminal or Sales Tax and/or other duties on material obtained for the work (excluding materials provided by B.H.E.L on payment) shall be borne by the contractor.

12. Royalties:

Royalties fixed from time to time as per prevalent local rules will be recovered for materials, which the Contractor may be allowed to remove from quarries situated on land which is in charge of the B.H.E.L authorities.

13. Plant and Equipment:

The Contractor, shall at his own expense, supply all tools, plant and equipment (here-in-after referred to as T & P) required for the execution of the contract other than those listed in Schedule 'C' which subject to their availability may be hired by B.H.E.L., to the Contractor or issued free for use in the execution of the work as specified in Tender Documents.

14. Assignment or Transfer of Contract:

The Contractor shall not, without the prior written approval of the Accepting Officer, assign or transfer the Contract or any part thereof, or any share, or interest therein to any other person. No sum of money which may become payable under the Contract shall be payable to any person other than the Contractor unless the prior written approval of the Accepting Officer to the assignment or transfer of such money is given.

14. (a) Sub Contract:

The Contractor shall not sub–let any portion of the Contract without the prior written approval of the Accepting Officer.

15. Compliance to Regulations and Bye Laws:

The Contractor shall conform to the provision of any statute relating to the work and regulations and bye-laws of any local authority and of any water and lighting Companies or Undertakings with whose system the work is proposed to be connected. He shall, before making any variation from the drawings or the specifications that may be necessitated for such connections give the Engineer–

in– charge notice, specifying the variation proposed to be made and the reasons there for and shall not carry out any such variation until he has received instructions from the Engineer–in–charge in respect thereof. The contractor shall be bound to give all notice required by Statute Regulations or Bye-laws as aforesaid and to pay all fees, and taxes payable to any authority in respect thereof.

CHAPTER III

PERFORMANCE OF THE CONTRACT

16. Security Deposit

16.1 Security Deposit should be collected from the successful tenderer. The rate of Security Deposit will be as below:

Upto Rs. 10 lakh	10%
Above Rs. 10 lakh upto Rs.50 lakh	1 lakh + 7.5% of the amount Exceeding Rs.10 Lakh
Above Rs. 50 lakh	4 lakh + 5 % of the amount exceeding Rs.50 Lakh

At least 50% of the security Deposit should be furnished before start of the work by the contractor in the form of Demand Draft / Bank Guarantee.

Security Deposit may be furnished in any one of the following forms :-

i) Cash (as permissible under the Income Tax Act)
ii) Pay Order, Demand Draft in favour of BHEL.
iii) Local cheques of scheduled banks in the name of BHEL subject to realization.
iv) Securities available from Post Offices such as National Savings Certificates, Kisan Vikas Patras etc. (Certificates should be held in the name of Contractor furnishing the security and duly pledged in favour of BHEL and discharged).
v) Bank Guarantee from Scheduled Banks / Public Financial Institutions as defined in the Companies Act subject to a maximum of 50% of the total security deposit value. The balance 50% has to be remitted either by cash or in the other form of security. The Bank Guarantee format should have the approval of BHEL.
vi) Fixed Deposit Receipt issued by Scheduled Banks / Public Financial Institutions as defined in the Companies Act . The FDR should be in the name of the contractor, A/C BHEL, duly discharged on the back.
vii) Security deposit can also be recovered at the rate of 10% from the running bills. However in such cases at least 50% of the Security Deposit should be collected before start of the work and the balance 50% may be recovered from the running bills.
viii) EMD of the successful tenderer shall be converted and adjusted against the security deposit.
ix) The security deposit shall not carry any interest.

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

All compensation or other sums of money payable by the Contractor to BHEL, under the terms of this Contract or under any other contract with BHEL, may be deducted from the Security Deposit or realized by the sale of the Securities or from the interest arising there from or from any sums which may be due or may become due to the Contractor payable by BHEL, on any account whatsoever against this Contract or any other Contract with BHEL, and in the event of his Security Deposit being reduced by reason of such deductions or sale as aforesaid, the Contractor shall, within seven days thereafter, make good in cash or in securities endorsed as aforesaid, any sum or sums by which the Security Deposit has been so reduced.

50% of the Security Deposit / may be refunded on completion of the work after payment of the final bill and the balance 50% of the Security Deposit is refundable only after the expiry of the maintenance period of Twelve (12) months from the date of completion of work as stipulated in the Contract concerned.

17. Order under the contract

All orders, notices etc., to be given under the contract shall be in writing typescript or printed and if sent by registered post to the address given in the tender of the contractor, shall be deemed to have been served on the date when in the ordinary course they would have been delivered to him.

The contractor shall carry out without delay all orders given to him.

18. Admission to site

The Contractor shall not enter on (other than for inspection purposes) or take possession of the site unless permitted to do so by the Engineer-in-charge. The portions of the Site to be occupied by the Contractor will be clearly defined and marked on the site plan, and the Contractor will on no account be allowed to extend his operations beyond these areas.

The Contractor shall provide, if necessary or required at the Site, temporary access there to and shall alter, modify and maintain the same as required from time to time. He shall take out and clear away the access route when no longer required and restoring the area to its original condition.

The Engineer-in-charge shall have power to execute other works (whether or not connected with the work in the contract agreement) on the site contemporaneously with the execution of the original work and Contractor shall give reasonable facilities for this purpose.

B.H.E.L reserves the right of taking over, at any time, any portion of the site which they may require and the Contractor shall at his own expense clear such portion forthwith. No photographs of the Site or of the work or any part there of shall be taken, published or otherwise circulated without the prior approval of the Engineer-in-charge.

No such approval shall however exempt the contractor from complying with any statutory provisions in regard to the taking and publication of such photographs.

B.H.E.L Officials connected with the Contract shall have the right of entry to the Site at all times.

Engineer - in charge shall have the power to exclude from the site any person whose admission there to may, in his opinion be undesirable for any reason whatsoever.

19. Contractor's Supervision

The Contractor shall either himself supervise the execution of the Contract or shall appoint a competent Agent approved by the Engineer–in–charge to act in his stead. The contractor shall employ an Engineer/Agent having at least a 'Degree of Bachelor of Civil Engineering' from a recognized University/on any work with a Contract value exceeding rupees two lakhs, and having at least a Diploma in civil Engineering from a recognised college, on work with a contract value exceeding Rs. 50,000/- but not exceeding rupees two lakhs.

The Employment of an Engineer/Agent as aforesaid shall not be necessary if the Contractor himself in possession of a recognized technical qualification and is in opinion of the Engineer-in-charge capable of receiving instructions of the Engineer–in–charge and of executing the work to the satisfaction of the Engineer–in–charge. If the Contractor fails to appoint a suitable Engineer/ Agent as aforesaid, the Engineer–in–charge shall have full powers to suspend the execution of work and stop payment of any advances that may have become due until such date as a suitable Engineer/Agent is appointed and the contractor shall be held responsible for the delay caused to the work and no extension of time on this account shall be given to him as stipulated in condition (9) above.
Orders given to the Contractor's Agent/Engineer shall be considered to have the same force as if they had been given to the Contractor himself.

The contractor or his Agent shall be in attendance at the site during all working hours and shall superintend the execution of work with such additional assistance in each trade as the Engineer–in - charge may consider necessary.

The contractor or his accredited agent shall attend when required and without making any claim for doing so, either the Office of the Engineer–in–charge or the work site to receive instructions.

The Engineer–in–charge shall have full powers, and without assigning any reason to require the Contractor immediately to cease to employ in connection with the Contract any Agent, servant or employee whose continued employment is, in his opinion undesirable.

The Contractor shall not be allowed any compensation on this account.

LABOUR

20. The Contractor shall employ labourer in sufficient numbers either directly or through sub-contractors 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 Engineer-in-charge. The Contractor shall not employ in connection with the works any person who has not completed his fifteen years of age.

The Contractor shall furnish to the Engineer-in-charge at the intervals specified by him, a distribution return of the number and description by trades of the work people employed on the works. The Contractor shall also submit on the 4^{th} and 19^{th} of every month to the Engineer-in-charge a true statement showing in respect of the second half of the preceding month and the 1^{st} half of the current month (i) the accidents that occurred during the said fortnight showing the circumstances under which they happened and the extent of damage and injury caused by them and (ii) The number of female workers who have been allowed maternity benefit as provided in the Maternity Benefit Act, 1961 or Rules made thereunder and the amount paid to them.

The Contractor shall pay to labour employed by him either directly or through sub–contractors wages not less than fair wages as defined in the Contractor's Labour Regulations.

The contractor shall in respect of labour employed by him either directly or through sub – contractors comply with or cause to be complied with Contractor's Labour Regulations in regard to all matters provided therein.

The Contractor shall comply with the provisions of the Payment of Wages Act 1936, Minimum Wages Act 1948, Employers liability Act 1938, Workmen's Compensation Act 1923, Industrial Disputes Act 1947, Maternity Benefit Act 1961 and Mines Act 1952, Contract Labour Regulation and Abolition Act 1970 or any modifications there of or any other law relating thereto and rules made thereunder from time to time.

The contractor shall be liable to pay his contribution and the employees' contribution to the State Insurance Scheme in respect of all labour employed by him for the execution of the contract, in accordance with the provision of " The Employees" State Insurance Act, 1948" as amended from time to time. In case the contractor fails to submit full details of his account of labour employed and the contribution payable, the Engineer–in–charge shall recover from the running bills of contractor an amount of contribution as assessed by him. The amount so recovered shall be adjusted against the actual contribution payable for Employees' State Insurance.

The Engineer–in–charge shall on a report having been made by an Inspecting Officer as defined in the Contractor's labour Regulations have the power to deduct from the moneys due to the Contractor any sum required or estimated to be required for making good the loss suffered by the worker or worker by reason of non-fulfillment of the Conditions of the Contract for the benefit of workers, non-payment of wages or of deductions made from his or their wages which are not justified by the terms of the Contract or non-observance of the said Contractor's Labour Regulations.

The Contractor shall indemnify the B.H.E.L against any payments to be made under and for observance of the Regulations aforesaid without prejudice to his right to claim indemnity from his sub-contractors.

In the event of the Contractor committing a default or breach of any of the provisions of the aforesaid Contractor's Labour Regulations, as amended from time to time or furnishing any information or submitting or filling any form / Register/Slip under the provisions of these Regulations

which is materially incorrect then on the report of the Inspecting Officers as defined in the Contractor's Labour Regulation, the Contractor shall without prejudice to any other liability pay to the B.H.E.L a sum not exceeding Rs. 50/- as liquidated damages for every default breach or furnishing, making submitting, filling materially incorrect statement as may be fixed by the Engineer–in–charge and in the event of the Contractor's default continuing in this respect, the liquidated damages may be enhanced to Rs. 50/- per day for each day of default subject to a maximum percent of the estimated cost of works put to tender.

The Engineer in charge shall deduct such amount from bills or security deposit of the Contractor and credit the same to the Welfare Fund constituted under Regulations. The decision of the Engineer-in-charge in this respect shall be final and binding.

Model Rules for Labour Welfare

The Contractor shall at his own expense comply with or cause to be complied with Model Rules for Labour welfare as appended to these Conditions or rules framed by Government from time to time for the protection of health and for making sanitary arrangements for workers employed directly/or indirectly on the works. In case the Contractor fails to make arrangements as aforesaid, the Engineer–in– charge shall be entitled to do so and recover the cost thereof from the Contractor.

Safety Code

The Contractor shall at his own expense arrange for the safety provisions as appended to these conditions or as required by the Engineer – in – charge, in respect of all labour directly or indirectly employed for performance of the works and shall provide all facilities in connection therewith. In case the Contractor fails to make arrangements and provide necessary facilities as aforesaid, the Engineer– in–charge shall be entitled to do so and recover the cost thereof from the Contractor.

Failure to comply with model Rules for Labour Welfare, Safety Code, or the provisions relating to report on accidents and to grant of maternity benefits to female workers shall make the Contractor liable to pay to the B.H.E.L as liquidated damages an amount not exceeding Rs. 50/- for each default or materially incorrect statement. The decision of the Engineer–in–charge in such matters based on reports from the Inspecting Officers as defined in the Contractor's Labour Regulation as appended to these conditions shall be final and binding and deductions for recovery of such liquidated damages may be made from any amount payable to the Contractor.

WATER

21. The Contractor shall allow in his Tender and provide at his cost all water required for the work or his employees on the work, together with all pipes and fittings or other means that may be necessary or required to ensure a proper and ample supply of water for all purposes connected with the work.

    Water will be supplied from the BHEL supply system, or other sources at one point fixed by the Engineer-in-charge on the site of work at free of cost. The Contractor shall make necessary arrangement for lifting pumping, carrying or conveying the water as required at his own cost.

22. Temporary Workshops, Stores Etc.

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

On completion of the work all such temporary buildings shall be cleared away and the site restored and left in a clean and tidy condition to the entire satisfaction of the Engineer-in-charge.

23. Stores and Materials on Site

All stores and materials required for the work are to be deposited by the Contractor only in places to be indicated by the Engineer-in-charge.

Where in accordance with the contract stipulations certain Stores & Materials (for incorporation in the work) are to be issued to the Contractor by the BHEL as detailed under Schedule 'B' **such items will be so issued only to the extent required for the actual completion of the work** as stipulated in the contract. The decision of the Engineer-in-charge regarding the quantities to be issued as above shall be final and binding on the contractor. For any excess quantities consumed on the work upto 5% over the theoretical consumption will be charged at issue rates and excess consumption beyond this limit, their cost will be recovered from the Contractor at punitive rates which will be 100% (Hundred Percent) more than the issue rates of the BHEL as specified in the Instructions to the Tenderers.

In regard to the materials and stores which may be issued to the Contractor by BHEL the Contractor shall give the Engineer-in-charge reasonable notice in writing of his requirements of such stores and materials and on the approval of his demand being notified to him, he shall make immediate arrangements for drawing the same. Such stores and materials shall be transported by the Contractor at his own expense direct from the place of issue to the site of the work, unless prior written approval is obtained from the Engineer-in-charge to take them to a Store or Workshop elsewhere.

The Contractor shall have to build a weather proof shed for the storage of cement required for 15 days consumption of the work.

BHEL Officers connected with the Contract shall have the power at any time to inspect and examine any stores or materials intended to be used in or on the work, whether on the site or at any factory or workshop or other place where such stores or materials are being fabricated or manufactured or at any place where the same are lying and the contractor shall give necessary facilities for such inspection and examination.

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

Should the Engineer-in-charge consider at any time during the construction or re-construction, on prior to the expiry of the "MAINTENANCE PERIOD" that the stores or materials provided by the Contractor are unsound or of a quality inferior to that contracted for or otherwise not in accordance with the contract (in respect whereof the decision of the Engineer-in-charge shall be final and conclusive) the Contractor, shall on demand, in writing from the Engineer-in-charge specifying the Stores or materials complained of, notwithstanding that the same may have been inadvertently passed, certified and paid for, forthwith remove the stores or materials so specified and provide other proper and suitable stores or materials at his own expense; to the entire satisfaction of the Engineer-in-charge and in the event of his failing to do so within a period to be specified by the Engineer-in-charge in his demand aforesaid the Engineer-in-charge may replace within others the stores or materials complained of at the risk and expense in all respects of the Contractor. The liability of the contractor under this condition shall not extend beyond the maintenance period aforesaid except as regards stores or materials which the Engineer-in-charge shall have previously given notice to the contractor to replace.

All stores and materials brought to the Site shall become and remain the property of B.H.E.L and shall not be removed from the site without prior written approval of the Engineer-in-charge. However, when the work is finally completed, the Contractor shall at his own expense forthwith remove from the site all surplus stores or materials originally supplied by him and upon such removal, the same shall revert in and become the property of Contractor. All B.H.E.L Stores and materials issued to Contractor for in-corporation or fixing in the work and which, making due allowance for reasonable wear and tear/or waste, have not on completion of the work been so incorporated or fixed, shall be returned by the Contractor at his own expense to the place of issue.

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

If, in the opinion of the Engineer-in-charge (which shall be final and conclusive) any stores, supplied by B.H.E.L have either during currency of the work or after completion of the work whilst under the custody of the Contractor, become damaged to such an extent that they cannot be usefully utilized, either in the same work or in other works, the Engineer-in-charge shall not accept the stores and in the event of his rejection the contractor shall be charged for the said Stores at a rate as fixed by the Accepting Officer. The Contractor shall not be entitled to any claim whatsoever on this account.

24 Tools and Plants on site:

All tools, plants and equipment brought to the site shall become the property of B.H.E.L and shall not be removed from the site without the prior written approval of the Engineer-in-charge when the work is finally completed or the Contract is determined for reasons other than the default of the Contractor he shall forthwith remove from the site all tools, plants, equipments etc., (other than those as may have been provided by B.H.E.L) and upon such removal, the same shall in, and become the property of the Contractor.

25. Statement of Hire Charges:

A monthly detailed statement of the hire charge incurred in respect of B.H.E.L tools, plants, equipments etc., shall be given to the Contractor by the Engineer-in-charge.

26. Precaution Against risks:

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

The Contractor shall provide all watchmen necessary for the protection of the site, the work, the materials, tools, plants, equipments and anything else lying on the Site during the progress of the work. He shall be solely responsible for and shall take all reasonable and proper steps for protecting, securing, lighting and watching, all places on or about the work and the Site which may be dangerous to any person whomsoever.

27. Notices and Fees:

The Contractor shall give all notices required by any Statutory provision or by the regulations and/or bylaws of any local Authority and/or of any Public Service, Company or Authority affected by the work or with whose system the same are or will be connected. The Contractor shall pay and indemnify B.H.E.L against any fees and charges payable under such Acts. Regulation and/or byelaws in respect of the work and shall make and supply all drawings and plans required in connection with any such notice.

28. Setting out of the Works and Protective and Maintaining Signals and Works:

The Engineer-in-charge shall supply dimensioned drawings, levels and other information necessary to enable the contractor to set out the work. The Contractor shall at his own expense set accurately according to the drawings and figured dimension thereon, all the work comprised in the contract and any extras or additions there-to and shall be solely responsible for their being so set out and executed. All bench marks, pegs, signals on the surface, alignment stones, milestones and all similar marks whether put in by B.H.E.L Authorities for the purpose of checking the Contractor's work or in the nature of permanent survey marks will during the tenure of the contract, be under the care of the Contractor who shall, at his own expense, take,all proper and reasonable

precautions and care to preserve and maintain them in their true position. In the event of these marks being disturbed or obliterated by accident or due to any other cause whatsoever, the same may, if deemed necessary, be replaced by the Engineer-in-charge at the Contractor's expense and the cost thereof deducted from any money then or thereafter becoming due to the Contractor.

Where requested by the Contractor, the level marks, center line and chainage pegs corresponding to those shown on the Drawing will be pointed out to the Contractor on the ground but all bench marks or chainage pegs additional to those shown on the Drawing will be set out by BHEL authorities.

29. Site Drainage:

All water that may accumulate on the site during the progress of the work or in trenches and excavations shall be removed to the entire satisfaction of the Engineer-in-charge and at Contractor's expense.

30. Excavations, Relics Etc.

Material of any kind obtained from excavation on the site shall remain the property of BHEL and shall be disposed off as Engineer-in-Charge directs.

All gold, silver, oil and other minerals of any description and all precious stones, coins, treasures, relics, antiques and other similar items which may be found in or upon the site shall be the property of Bharat Heavy Electricals Limited and the Contractor shall duly preserve the same to the satisfaction of the BHEL and shall from time to time deliver the same to such person or persons as the B.H.E.L may appoint to receive the same.

31. Foundations

The Contractor shall not lay any foundations until the excavations for the same have been examined and approved in writing by the Engineer-in-charge.

32. Covering-in Work

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

33. Approval of works by Stages:

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

34. Execution of the Work:

The work shall be executed in a workman-like manner and to the satisfaction in all respects of the Engineer-in-charge.

The Engineer-in-charge will communicate or confirm his instructions to the Contractor in respect of the execution of the Work in a "Work Site Order Book" maintained at his office and the Contractor shall visit this office daily and shall confirm receipt of such instructions by signing the relevant entries in this book. Such entries will rank as order or notices in writing within the intent and meaning of these conditions.

35. Day Work:

No day-work shall be performed without the prior written instructions of the Accepting Officer.

The Contractor shall give to the Engineer-in-charge reasonable notice of the start of any work ordered to be executed by day-work and shall deliver to the Engineer-in-charge within two days of the end of each pay week a return in duplicate giving full detailed accounts of labour and materials for that pay-week. One copy of each of these returns, if found correct, will be certified by the Engineer-in-charge and returned to the contractor and must be produced at the time of adjustment of accounts.

An invoice in duplicate signed by the Contractor or his agent shall be sent with each delivery of materials for day-work and the Contractor will be furnished with a receipt signed by the Engineer-in-charge specifying the description, quantities weight or measurement (as the case may be) of the articles approved, reference will be made in this receipt in the return aforesaid and the Contractor's Bill.

In the case of Lumpsum Contracts, the rates to be charged and the percentage addition for profit and establishment charges, etc., will be agreed upon between the Accepting Officer and the Contractor prior to the execution of the work.

36. Inspection of the Work:

B.H.E.L Officers concerned with the Contract shall have power at any time to inspect and examine any part of the work and the Contractor shall give such facilities as may be required to be given for such inspection and examination Should Engineer-in-charge consider, at any time during the expiry of the maintenance period, that any work has been executed with unsound, imperfect or unskilled workmanship or of a quality inferior to that contracted for or not otherwise in accordance with the contract (in respect) whereof the decision of the Engineer-in-charge shall be final and conclusive the Contractor shall on demand in writing from the Engineer-in-charge specifying the fault notwithstanding that the same may have been inadvertently passed, certified and paid for, forthwith rectify or remove and reconstruct the work so specified in whole or in part as the case may be required at his own expense to the entire satisfaction of the Engineer-in-charge and in the event of his failing to do so within a period to be specified by the Engineer-in-charge in his demand as aforesaid, the Engineer-in-charge may carry out the work by other means at the risk and expense in all respects of the Contractor. However, the liability of the Contractor under this condition shall not extend beyond the maintenance period except as regards workmanship which the Engineer-in-charge shall have previously given notice to the Contractor to rectify.

37. Responsibility for Building:

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

38. Insurance

The contractor shall within one month after the date of the acceptance of the contract, insure the work against loss or damage to the contract works, temporary work and materials erected in performance of the contract on "all risks" basis from the time of arrival on site until taken over by BHEL on completion of the contract.

The cover shall also include wherever necessary the risks of testing including breakdown or explosion of plant and machinery undergoing testing, trail and commissioning operations. The insurance shall also specifically cover removal of debris cost. The sum insured shall represent the estimated full value of the contract works inclusive of value of free supply materials by BHEL, transport charges, customs dues, express freight, overtime charges, cost of erection, value of constructional plants and machinery, removal of debris and escalation of costs where the

contract includes a maintenance period, the insurance cover shall specifically include the contractors' liabilities during the maintenance period. The insurance shall also be extended to cover third party personal injury and property damage for a sum to be specified by BHEL. The insurance shall be effected in the name of BHEL and the contractor shall submit to BHEL a draft of the insurance policy for approval. The policy when issued will be lodged with BHEL together with receipts of premium for such insurance and the contractor shall maintain such policies in force until the obligations of the contractor are fully discharged.

If the contractor fails to comply with the terms of this condition the Accepting officer may insure the work and may deduct the amount of premiums from any money that may become payable to the contractor or may at his discretion refuse payment of any advances to the contractor until the contractor shall have complied with the terms of this condition. This provision does not, however, absolve the contractor of his responsibility for taking up the insurance. The contractor is, therefore, primarily responsible for taking up the insurance in time.

39. Damage and loss to private property and injury to workmen

The contractor shall at his own expense reinstate and make good to the satisfaction of the Engineer–in-charge and pay compensation for any injury, loss or damage occasioned to any property or rights whatever including property and rights of **B.H.E.L**, (or agents, servants or employees of **B.H.E.L**) the injury loss or damage arising out of or in anyway in connection with the execution or purported execution of the contract and further the contractor shall indemnify B.H.E.L, against all claims enforceable against B.H.E.L, or any agent, servant, or employee of B.H.E.L a private person, in respect of any such injury (including injury resulting in death loss or damage to any person) whosoever or property, including all claims which may arise under the workmen's Compensation Act or otherwise, or which would be enforceable against B.H.E.L.

40. Completion

The works shall be completed to the entire satisfaction of the Engineer-in-charge and in accordance with the Contractor's forecast of Time and Progress where operative, and all unused stores and materials, tools, plants, equipments, temporary buildings and things shall be removed and the site and work cleared of rubbish and all waste materials and delivered up clean and tidy to the satisfaction of the Engineer-in-charge at the Contractor's expense and/or before the Scheduled date of completion.

The B.H.E.L shall have power to take over from the Contractor from time to time each sections of the work as have been completed to the satisfaction of the Engineer-in-charge.

In case the Contractor fails to remove any of his properties, assets or fails to clear the rubbish and waste materials within 30 days of the completion of the contract, it is lawful for the contractee, that is BHEL to take such action as it deems fit to clear dispose of such properties, assets or such waste materials and charge the contractor any expenses incurred thereon.

The Engineer-in-charge shall certify to the Contractor the date on which the work is completed and the state thereof.

The Engineer-in-charge shall also certify to the Contractor the state of the work at the end of maintenance period, where applicable.

41. Compensation for Delay:

If the contractor fails to maintain the required progress in terms of condition 7 or to complete the work and clear the site on or before the contracted or extended period of completion, he shall, without prejudice to any other right or remedy of the B.H.E.L on account of such breach, pay as agreed compensation an amount calculated as stipulated below or such smaller amount as may be fixed by the BHEL on the contract value of the work for every week that the progress remains below that specified in condition 7 or that the work remains incomplete.

This will also apply to items or group of items for which separate period of completion has been specified.

For this purpose the term 'Contract Value' shall be the value at contract rates of the work as ordered.

a. Completion period (as originally-stipulated) -- at 1 percent per week.
Not exceeding 6 months.

b. Completion period (as originally-stipulated) -- at ½ percent per week
Exceeding 6 months and not exceeding 2 years.

c. Completion period (as originally-stipulated) -- at¼ percent per week
Exceeding 2 years.

Provided always that the total amount of compensation for delay to be paid under this condition shall not exceed the under noted percentage of the contract value or of the contract value of the item or group of items of work for which a separate period of completion is given:

a.	Completion period (as originally-stipulated) Not exceeding 6 months.	--	10 percent.
b.	Completion period (as originally-stipulated) Exceeding 6 months and not exceeding 2 years.	--	7½ percent.
c.	Completion period (as original-stipulated) Exceeding 2 years	--	5 percent.

The amount of compensation may be adjusted or set-off against any sum payable to the Contractor under this or any other contract with the B.H.E.L.

42. Laws Governing the Contract:

This contract shall be governed by the Indian Laws for the time being inforce.

43. Cancellation of Contract for Corrupt Acts:

The Accepting Officer, whose decision shall be final and conclusive, shall, without prejudice to any other right or remedy which shall have accrued or shall accrue thereafter to Bharat Heavy Electricals Limited, cancel the contract in any of the following cases and the Contractor shall be liable to make payment to B.H.E.L for any loss or damage resulting from any such cancellation for default.

If the Contractor shall:

a. Offer or give or agree to give to any person in BHEL service any gift or consideration of any kind as an inducement or reward for doing or for bearing to do or for having done or forborne to do a day act in relation to the obtaining or execution of this or any other contract for BHEL service **OR**

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

c. Obtain a contract with B.H.E.L as a result of ring tendering or by non-bonafide methods of competitive tendering without first disclosing the fact in writing to the Accepting Officer.

44. Cancellation of Contract for Insolvency, Assignment or Transfer or Sub-Letting of Contract:

The Accepting Officer, without prejudice to any other right or remedy which shall accrue thereafter to B.H.E.L shall cancel the contract in any of the following cases:

If the Contractor,

a) Being an individual, or if a firm any partner thereof shall at any time be adjudged bankrupt or have a receiving order or orders for administration of his Estate made against him or shall take any

proceedings, for liquidation or composition under any Bankruptcy Act for the time being in force or make any conveyance or assignment of his effects of composition or arrangement for the benefit of his creditor or purport to do so, or if any application be made under any Bankruptcy Act for the time being in force for the sequestration of his Estate or if a trust deed be granted by him on behalf of his creditors, OR

b) Being a Company, shall pass a resolution or the Court shall make an order for the liquidation of its affairs, or a Receiver or Manager on behalf of the debentures holders shall be appointed or circumstances shall arise which entitle the court or debentures holders to appoint a Receiver or Manager **OR.**

c) Assigns, transfers, sub-lets or attempts to assign, transfer or sub-let any portion of the work without the prior written approval of the Accepting Officer. **OR**

d) Shall suffer an execution being levied on his goods and allow it to be continued for a period of 21 days.

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

Engineer-in-charge will have powers to take possessions of the site and any materials, constructional plant, implements, stores, etc, thereon and or carryout the work by any means at the risk and cost of the contractor.

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

If the contractor fails to pay the excess sum within a period of 30 days, the Engineer-in-charge shall have the right to sell any or all of the contractor's unused materials, constructional plant implements, temporary buildings, etc., and apply the proceeds of sale thereof towards the satisfaction of any sum due from the contractor under the contract and if thereafter be any balance outstanding from the contractor, it shall be recovered in accordance with the provisions of the contract.

45. Cancellation of contract in part or in full for contractor's default:

If the Contractor:

(a) makes default in commencing the work within a reasonable time from the date of handing over of the site and continue in that state after a reasonable notice from Engineer-in-charge, OR

(b) in the opinion of the Engineer-in-charge at any time, whether before or after the date or extended date for completion, makes default in proceeding with the work, with due diligence and continue in that state after a notice of seven days from Engineer-in-charge, OR

(c) fails to comply with any of the terms and conditions of the contract or after 7 days notice in writing with orders properly issued there under, (OR)

(d) fails to complete the work order and items of work individual dates for completion and clear the site on or before the date of completion or fails to achieve the progress as set out under clauses 7 of these General Conditions of Contract.

The Accepting Officer may, without prejudice to any other right or remedy which shall have accrued or shall accrue there after to B.H.E.L cancel the contract as a whole or in part thereof or only such work order or items of work in default from the contract. Whenever the Accepting Officer exercises his authority to cancel the contract as a whole or in part under this conditions he may complete the work at the Contractor's risk and cost, provided always that in the event of the cost of completion (as certified by Engineer-in-charge which is final and conclusive) being less than the contract cost the advantage shall accrue to the B.H.E.L if the cost of completion exceeds, the money due to the contractor under this contract, the contractor shall either pay the excess amount ordered by Project Manager or the same shall be recovered from the contractor by other means. Engineer-in-charge will have power to take possession of the site and any materials, constructional plant, implements, Stores, etc., thereon.

In case the B.H.E.L completes the work or any part thereof under the provisions of this conditions the cost of such completion to be taken in to account in determining the excess cost to be charged to the contractor under this conditions shall consists of the cost of materials purchased and/or labour provided by the B.H.E.L with an addition of such percentage to cover superintendence and establishment charges as
may be decided by the Project Manager/Engineer whose decision shall be final and conclusive.

If the contractor fails to pay the excess sum within a period of 30 days, the Engineer-in-charge shall have the right to sell any or all of the contractor's unused materials, constructional plant implements, temporary buildings, etc, and apply the proceeds of sale thereof towards the satisfaction of any sum due from the contractor under the contract and if thereafter be any balance outstanding from the contractor it shall be recovered in accordance with the provision of the contract.

46. Termination of Contract for Death

Without prejudice to any of the rights or remedies under this contract if the contractor dies, the accepting Officer shall have the opinion of terminating the contract without compensation to the contractor.

47. Special Powers of Determination

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

He shall be paid at Contract rates, for the full amount of the work executed including such additional works, e.g. clearing of site, etc., as may be rendered necessary by the said fore closing. He shall also be allowed a reasonable payment (as decided by the Accepting Officer) for any expenses sustained on account of labour and materials collected but which could not be utilised on the work, as verified by the Engineer-in-charge. Neither shall the Contractor have any claim for compensation on account of any alterations having been made in the original specifications, drawings, designs and instructions, involving any curtailment of the work as originally contemplated.

48. Fair Wage

a) The contractor shall pay not less than the " Fair Wage" to labourers engaged by him on the work.

"Fair Wage" means wage whether for time or piece work notified at the time of inviting tenders for the work and where such wages have not been notified the wages prescribed by the Project Manager/Engineer for the stations at which the work is done.

b) The Contractor shall not with standing the provision of any contract to the contrary, cause to be paid a "Fair Wage" to labourers indirectly engaged on the work, including any labour

engaged by the Sub-Contractors in connection with the said work, as if the labourers had been directly employed by him.

c) In respect of labourers directly or indirectly employed on the work for the performance of the Contractors part of this Agreement, the Contractor shall comply with or cause to be complied with B.H.E.L Contractor's Labour Regulations (appended here to as Annexure 'A' to these conditions) in regard to payment of wages, wage period deduction from wages, recovery of wages not paid and deductions unauthorisedly made, maintenance of wage book, wage-slips publication of scale of wage and other terms of employment inspection and submission of periodical returns and all other matters of alike nature.

d) The Engineer-in-charge concerned shall have the right to deduct from the money due to the contractor any sum required or estimated to be required for making good the loss suffered by a worker or workers by reason of non-fulfilment of the conditions of the contract for the benefit of the workers non-payment of wages or of deductions made from his or their wages which are not justified by the terms of the contract or non-observance of the regulations.

e) The Contractor shall be liable primarily for all payments to be made under the contract and for the observance of the Regulations aforesaid without prejudice to his right to claim indemnity from his sub-contractors.

d) The regulations aforesaid shall be deemed to be a part of this contract and any breach thereof shall be deemed to be a breach of this Contract.

CHAPTER IV

VALUATION AND PAYMENT

49. Records and Measurements:

All items having a financial value shall be entered in the B.H.E.L Measurement Book so that a complete record is obtained of all works performed under the Contract.

Buildings, etc., priced in Schedule 'A' as a unit lumpsum will be entered by number at the unit lumpsum.

Work carried out for agreed lumpsum will be described and similarly recorded.

Lumpsum omissions will be entered for deduction. Measurement shall be restricted to that required to ascertain the financial liability of B.H.E.L under the contract.

Work which fails to be measured in detail shall be measured physically, without reference to any local custom that may obtain excepting where it may otherwise be directed in the tender documents. The measurements shall be taken jointly by any person duly authorized on the part of the BHEL and by the Contractor.

The Engineer-in-charge shall give reasonable notice in writing to the Contractor of appointment for measurement.

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

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

Measurement shall be entered in the B.H.E.L Measurement Book and signed and dated by both parties each day at the Site on completion of measurement. If the Contractor objects to any of the measurements recorded on behalf of the B.H.E.L a note to that effect will be made in the BHEL Measurement Book or against the item or items objected to; and such note shall be signed and dated by both the parties engaged in taking the measurement.

If, as a result of such objection, it becomes necessary to re-measure the work wholly or in part, the expense of such re- measurement shall be borne by the party requiring the measurement.

Measurement to be re-taken, provided that a net error is found by this remeasurement to amount to less than 5% (five percent) of the value as recorded by the first measurement. But, where the net errors amount to 5% and over of the said value, then the cost is to be borne by the other party. In any case, if the net value of errors found exceeds Rs. 500/- the expense of re-measurement is to be borne by the other party. If the Contractor's representative fails to attend when required, the Engineer-in-charge shall have power to proceed by himself to take measurement and in that case these measurements shall be accepted by the Contractor as final.

The contractor shall, once every month, submit to the Engineer-in-charge with a copy to the Civil Manager/Senior Engineer details of his claims for the work done by him up to and including the previous month which are not covered by his Contract Agreement in any of the following respects;

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

Except where any general or detailed description of the work in quantities expressly shows to the contrary, schedule of quantities shall be deemed to have been prepared and measurements shall be taken in accordance with

the procedure set forth in the schedule of rates specification notwithstanding any provision in the relevant standard method of measurement or any general or local custom. In the case of items which are not covered by the schedule of rates / specification, measurements shall be taken in accordance with relevant standard method of measurement issued by the Indian Standard Institution or as per standard engineering practice.

50. Valuation of Deviations:

Rates for deviated items of work will be fixed as follows:-

1. For any item of work required to be carried out after the contract has been awarded and which is not covered by Contractor's Schedule but is covered by B.H.E.L Schedule of rates the rate payable for such a fresh item will be derived from B.H.E.L Schedule by the method of proportion as follows:

a. In the same proportion to rate in B.H.E.L Schedule of Rates as the tendered rate for the nearest analogous item of work in Contractor's schedule bears to rate for the particular analogous item of work in B.H.E.L Schedule of rates.

b. If a single appropriate analogous item of work is not available in both Schedule (Contractor's and B.H.E.L Schedule) then the method of proportion will be applied to the nearest analogous group of items available in both the Schedules referred to i.e. in the same proportion as the total tendered cost of that particular group of items (the sum of the products of the tendered rates and the quantities for which orders are placed bears to the total cost of the same items and quantities at the B.H.E.L Schedule of Rates.

c. If even an appropriate analogous group of items is not available in Contractor's Schedule and B.H.E.L Schedule, then the methods of proportion will be applied to all those items of the whole work, which are available in both the Schedules and for which orders have been placed on the contractor, i.e., in the same proportion as the total cost of all these items of work (the sum of the products of the tendered rates and the quantities for which orders are placed) bears to the total cost of the same items and qualities at the B.H.E.L Schedule of Rates.

II. If any work not covered by any of the foregoing is ordered on the Contractor, the basis of payment shall be decided by the Accepting Officer whose decision shall be final and conclusive and binding on the parties.

The selection of analogous items or analogous group of items referred to above shall be done by the Engineer-in-charge. Where the rates for deviated items or new items of work can be derived by the selection of different analogous items or analogous group of items, the lowest of all such derived rates shall be taken as the correct rate.

In the case of the contracts for which the Engineer-in-charge is the Accepting Officer, all disputes regarding the settlement of rates of deviated or new items or work shall be referred to the Deputy Manager/Manager whose decision shall be final and conclusive as the case may be.

51. Reimbursement / Refund on Variation in Price, Materials:

If after submission of the tender and/or during the progress of the works, the price of any material (not being a material supplied from the B.H.E.L store in accordance with the Conditions of the Contract) is increased or decreased by an Act of Legislature (Central or State) and/or any notification there under or on account of new duties or levies such as octroi or on account of increase or decrease in such duties affecting the price of materials required for incorporation in the works and made from materials of

which the price has increased or decreased as aforesaid and the Contractor has thereupon to pay in respect of such material or item a price which is higher or lower than the price of that material or item as prevailing immediately before the passing of such Act or levying, increasing/ decreasing of such duty, the B.H.E.L shall incase of increase in price or the duty reimbursed to the contractor and incase of decrease in price, the B.H.E.L shall be entitled to a refund of the reduction price or the reduction in duty. Provided, however no reimbursement or refund shall be made if the increase/decrease is not more than 10% of the said price, and if so, the reimbursement or refund shall be made only on the excess over 10% provided always that any such increase shall not be payable if, in the opinion of the Deputy Manager/Manager (whose decision shall be final and conclusive) the increase is attributable to the delay in the execution of the contract within the control of the contractor or that any such increase has become operative after the contracted/or extended date of completion of the work or items of work in question.

The Contractor shall, for the purpose of this condition, keep such books of account and other documents as are necessary to show the amount of any increase claimed or any reduction available and shall allow inspection of the same by any duly authorized representative of the B.H.E.L and further shall at the request of the Engineer-in-charge furnish for verification such other information of the Engineer-in-charge may require.

The Contractor shall within a reasonable time of his becoming, aware of any alteration in the prices of any such materials, give notice thereof in writing to the Engineer-in-charge stating that the rate is submitted in pursuance to this condition together with all information relating thereto which he may be in a position to supply.

52. Advances on Account:

No payment shall be made for work estimated to cost less than Rupees **FIVE THOUSAND** till the whole of the work shall have been completed and a certificate of completion given by the Competent Authority.

In the case of work estimated to cost more than Rupees **FIVE THOUSAND** the contractor may at intervals of not less than one month or as otherwise provided for in the Contract Documents, counting from the date on which order to commence work is given by Engineer-in-charge submit claims on B.H.E.L forms for payment of advances on account of work done and of materials delivered in connection with the Contract.

The contractor shall be paid in respect of such claims to the extent approved and passed by the Engineer-in-charge subject a maximum of 90% of the value of the work actually executed to the satisfaction of the Engineer-in-charge. The certificate of the Engineer-in-charge regarding such approval and passing of the sums so payable shall be final and conclusive against the Contractor.

> "After the full amount of Security Deposit is made up through the 10% deduction from On account" bills, 100% payment of all subsequent bills may be made to the Contractor.

The Contractor may also be paid during the progress of the work 75% of the value of any materials which are in the opinion of the Engineer-in-charge in accordance with the Contract, and are actually required for incorporation in the work and which have reasonably been brought to the site in connection therewith and are adequately stored and / or protected against damage by weather or other causes, but which have not at the time of payment of the advance been incorporated in the work on furnishing a formal hypothecation deed. Payment of such advances, however, shall be purely at the discretion of the Deputy Manager/Senior Engineer provided always that payments shall not be made under these periodical certificates in respect of perishable materials like lime, cement, timber, sand, kankar, etc., Any sums/due from the Contractor on account of Tools and Plant, Stores or any other items provided by B.H.E.L shall be deducted from the respective advances, the Engineer-in-charge shall from time to time certify the sums payable to the contractor after retaining the reserves.

Any certificate relating to work done or materials delivered may be modified or corrected by any subsequent interim certificate or by the final certificate and no certificate of the Engineer-in-charge supporting an advance payment shall itself be conclusive evidence that any work or materials to which it relates are in accordance with the contract. All such intermediate payments shall be regarded as advances against the final payment only and shall not be considered as an admission

of the due performance of the contract or any part there of in any respect or the accruing of any claim whatsoever.

Such intermediate payment shall not conclude, determine or affect in any way the powers of the Engineer-in-charge as to the final settlement and adjustment of the accounts or otherwise, or in any way vary or affect the contract.

53. Final Bill

As soon as possible after the completion of the work to the satisfaction of the Engineer-in-charge, the contractor shall forward a certified final account on BHEL form, in duplicate.

It shall be accompanied by all abstracts, vouchers etc., in support thereof and shall be prepared in the manner prescribed by the Engineer-in-charge.

No claims will be entertained after the receipt of the final bill.

The Contractor shall be entitled to be paid the final sum less the value of payments already made on account subject to certification of the final bill by the Engineer-in-charge. Any sums due from the contractor on account of Tools & Plant, Stores or any other items provided by BHEL not yet recovered from the contractor shall be deducted from the final sum aforesaid.

No charge shall be allowed to the Contractor on account of the preparation of the final bill.

54. Payment of Bills

All payment to be made to the Contractor under this contract shall be by "Crossed Cheque" marked 'A/C payee only (Within a reasonable time after the Certification by the Engineer-in-charge) at the State Bank of India or their subsidiaries located in the station where either the work is executed or service rendered or at their branch nearest to the station where the Officer of the Engineer-in-charge is located.

55. Recovery from Contractor:

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

56. Post Technical Audit of Work and Bills:

BHEL reserves the right to carry out a post-payment audit and technical examination of the work and final bill including all supporting vouchers, abstracts etc., and to enforce recovery of any sums becoming due as a result thereof in the manner provided in the preceding sub-paragraphs provided however that no such recovery shall be enforced after three years of passing the final bill.

57. Refund of Security Deposit:

50% of the Security Deposit mentioned in condition 16 above, may be refunded to the contractor in respect of all contracts on completion of work and after payment of final bill and the balance 50% on expiry of the maintenance period, (described under clause 23) provided the contractor shall have rendered a "No-Demand" Certificate. In case of works where maintenance period is not involved 100% of the Security Deposit may be refunded after payment of final bill provided that the contractor shall have rendered a "No-Demand Certificate".

58. Arbitration:

Except where otherwise provided for in the contract all questions and disputes relating to the meaning of the specifications, designs, drawings and instructions hereinbefore mentioned and as to the quality of workmanship or materials used on the work or as to any other question, claim, right, matter or thing whatsoever in any way arising out of or relating to the contract, designs, drawings, specifications, estimates, instructions, orders or these conditions or otherwise concerning the work or failure to execute the same whether arising during the progress of the work or after the

completion or abandonment thereof shall be referred to the sole arbitration of the Executive Director / General Manager of BHEL and if ED is unable or unwilling to act, to the sole arbitration of some other person appointed by the ED / General Manager, willing to act as such arbitrator. The cases referred to arbitration shall be other than those for which the decision of the Manager / Senior Engineer / Engineer-in-charge is expressed in the contract to be final and conclusive. There will be no objection if the arbitrator so appointed is an employee of B.H.E.L and that he had to deal with the matters to which the contract relates and that in the course of his duties as such he had expressed views on all or any of the matters in dispute or difference.

The arbitrator to whom the matter is originally referred being transferred or vacating his office or being unable to act for any reason, such Executive Director / General Manager as aforesaid at the time of such transfer, vacation of office or inability to act, shall appoint another person to act as arbitrator in accordance with the terms of the contract. Such person shall be entitled to proceed with the reference from the stage at which it was left by his predecessor.

Subject as aforesaid the provision of the Arbitration & Reconciliation Act, 1996 or any statutory modification or re-enactment thereof and the rules made there under and for the time being in force shall apply to the arbitration proceeding under this clause.

It is a term of the contract that the party involving arbitration shall specify the dispute or disputes to be referred to arbitration under this clause together with the amount or amounts claimed in respect of each such dispute.

The arbitrator(s) may from time to time with consent of the parties enlarge the time for making and publishing the award.

The work under the Contract shall, if reasonably possible, continue, during the arbitration proceedings and no payment due or payable, to the Contractor shall be withheld on account of such proceeding.

The Arbitrator shall be deemed to have entered on the reference on the date he issues notice to both the Parties fixing the date of first hearings.

The arbitrator shall give a separate award in respect of each dispute or difference referred to him.

The venue of arbitration shall be such place as may be fixed by the Arbitrator in his sole discretion.

The award of the arbitrator shall be final, conclusive and binding on all parties to this contract.

In the event of disputes or differences arising between one public sector enterprise and a Govt. Department or between two public sector enterprises the above stipulations shall not apply the provisions of BPE office memorandum No. BPE/CL 001/ 76MAN / 2 (1.10) 75-BPE (GM-1) dated 1st January 1976 or its amendments for arbitration shall be applicable.

ANNEXURE 'A'

B.H.E.L CONTRACTOR'S LABOUR REGLUATIONS
(See condition 20)

1. Definition:

In these regulations, unless otherwise expressed or indicated, the following words and expressions shall have the meaning hereby assigned to them.

a) "Labour" means workers employed by a contractor directly, or indirectly through a sub-contractor, or by an agent on his behalf on a payment not exceeding Rs.500 per month.

b) "Fair Wage" means wages, which shall include wages for weekly day of rest and other allowances, whether for time or piece work, after taking into consideration prevailing market rates for similar employments in the neighborhood but shall not be less than the minimum rates of wages fixed under the minimum Wages Act.

c) "Contractor" for the purpose of these Regulations shall include an agent or Sub-Contractor employing labour on the work taken on contract.

d) "Inspecting Officer" means any Labour Enforcement Officer, or Assistant Labour Commissioners of the Chief Labour Commissioner's Organisation.

e) "Form" means a form appended to these Regulations.

2. Notice of Commencement :

The Contractor shall, within **SEVEN DAYS** of commencement of the work, furnish in writing to the Inspecting Officer of the area concerned the following information with copy to the Engineer-in-charge.

a) Name and situation of the work.
b) Contractor's name and address.
c) Particulars of the Department for which the work is undertaken.
d) Name and address of sub-contractors as and when they are appointed
e) Commencement and probable duration of the work
f) Number of workers employed and likely to be employed,
g) 'Fair wages' for different categories of workers.

3. (i) Number of hours which shall constitute a normal working day:
The number of hours which shall constitute a normal working day for an adult shall be **NINE** hours. The working day of an adult worker shall be so arranged that of intervals, if any, for rest it shall not spread over more than twelve hours on any day. When an adult worker is made to work for more than **NINE** hours on any day or for more than FORTY EIGHT hours in any week he shall in respect of overtime work, be paid wages at double the ordinary rate of wages.

(ii) Weekly day of rest: Every worker shall be given a weekly day of rest which shall be fixed and notified atleast TEN days in advance. A worker shall not be required or allowed to work on the weekly rest day unless he has or will have a substituted rest day, on one of five days immediately before or after the rest day. Provided that no substitution shall be made which will result in the worker working for more than ten days consecutively without a rest day for a whole day.

Where in accordance with the foregoing provisions a worker works on the rest day and has been given a substituted rest day he shall be paid wages for the work done on the weekly rest day at the overtime rate of wages.

NOTE: The expression 'Ordinary rate of wages' means the fair wage the worker is entitled to.

4. Display of Notice Regarding Wages, Weekly Day of Rest, Etc.:

The Contractor shall before he commences his work on contract display and correctly maintain and continue to display and correctly maintain in clean and legible condition in consipicuous places on the works, notice in English and in the local Indian languages, spoken by majority of workers, given the rate of fair wages, the hours of work for which such wages are payable, the weekly rest days workers are entitled to and name and address of the Inspecting Officer. The Contractor shall send a copy each of such notices to the Inspecting Officers and the Engineer-in-charge.

5. Fixation of Wage Periods:

The Contractor shall fix wage periods in respect of which wages shall be payable .
No wage period shall normally exceed one week.

6. Payment of Wages:

(i) Wages due to every worker shall be paid to him direct. All wages shall be paid in current coins or currency or in both.

Wages of every worker employed on the contract shall be paid where the wage period is one week, within, **THREE DAYS** from the end of the wage period, and in any other case before the expiry of the 7^{th} day or 10^{th} day from the end of the wage period according as number of workers does not exceed 1,000.

(ii) When employment of any worker is terminated by or on behalf of the contractor, the wages earned by him shall be paid before expiry of the day succeeding the one on which his employment is terminated.

(iii) Payment of wages shall be made at the work site on a working day except when the work is completed before expiry of the wage period, in which case final payment shall be made at the work site within 48 hours of the last working day and during normal working time.

NOTE: The term "Working Day" means a day on which the work on which labour is employed is in progress.

7. Register of Workmen :

A register of workmen shall be maintained in the form appended to these regulations and kept at the work site or as near to it as possible, and the relevant particulars of every workmen shall be entered therein within **THREE** days of his employment.

8. Employment Card:

The Contractor shall issue an employment card in the Form appended to these regulations to each worker on the day of work or entry into his employment. If a worker has already any such card with him issued by the previous employer the contractor shall merely endorse that Employment Card with relevant entries. On termination of employment the Employment Card shall again be endorsed by the Contractor and returned to the worker.

9. Register of Wages etc., :

(i) A register of Wages-cum-Muster Roll in the Form appended to these regulations shall be maintained and kept at the work site or as near to it as possible.

(ii) A wage slip in the form appended to these regulations shall be issued to every worker employed by the Contractor atleast a day prior to disbursement of wages.

10. Fines and Deductions which may be made from wages:

(i) Wages of worker shall be paid to him without any deductions of any kind except the following:

a. Fines;

b. Deductions for absence from duty, i.e., from the place or the places where by the terms of his employment he is required to work. The amount of deduction shall be in proportion to the period for which he was absent.

c. Deduction for damage to or loss of goods expressly entrusted to the employed person for custody, or for loss of money which he is required to account for, where such damage or loss is directly attributable to his neglect or default;

d. Deductions for recovery of advances or for adjustment of overpayment of a wages. Advance granted shall be entered in a register;

and

e. Any other deduction, which the B.H.E.L may from time to allow.

ii. No fines shall be imposed on a worker save in respect of such acts and omissions on his part as have been approved by the Chief Labour Commissioner.

iii. No fines shall be imposed on a worker and no deductions for damage or loss shall be made from wages until the worker has been given an opportunity of showing cause against such fines or deductions.

iv. The total amount of fines which may be imposed in any one wage period on a worker shall not exceed an amount equal to three paise in rupee of the wages payable to him in respect of that wage period.

v. No fine imposed on a worker shall be recovered from him in instalments, or after expiry of sixty days from the date on which it was imposed. Every fine shall deemed to have been imposed on the day of the act or omission in respect of which it was imposed.

vi. The Contractor shall maintain both in English and the local Indian language a list, approved by the Chief Labour Commissioner, clearly stating the acts and omissions for which penalty or fine may be imposed on a workman and display it in good condition in a conspicuous place on the work site.

vii. The Contractor shall maintain a register of fines and the register of deductions for damage or loss in the Forms appended to these regulations which should be kept at the place of work.

11. Register of Accidents :

The Contractor shall maintain a register of accidents in such form as may be convenient at the work place but the same shall include the following particulars:

a. Full particulars of the labourers who met with the accident.
b. Rates of Wages.
c. Sex
d. Age
e. Nature of accident and cause of accident.
f. Time and date of accident.
g. Date and time when admitted in hospital.
h. Date of discharge from the hospital.
i. Period of treatment and result of treatment.
j. Percentage of loss of earning capacity and disability as assessed by Medical Officer.

k. Claim required to be paid under Workmen's Compensation Act.
l. Date of payment of compensation.
m. Amount paid with details of the person to whom the same was paid.
n. Authority by whom the compensation was assessed.
o. Remarks.

12. Preservation of Registers :

The Register of Wages-cum-Muster Roll required to be maintained under these Regulations shall be preserved for 3 years after the date on which last entry is made therein.

13. Enforcement :

The Inspecting Officer shall either on his own motion or on a complaint received by him carry out investigations, and send a report to the Engineer-in-charge specifying the amounts representing workers, dues and amount of penalty to be imposed on the contractor for breach of these Regulations, that have to be recovered from the contractor, indicating full details of the recoveries proposed and the reasons therefore. It shall be obligatory on the part of the Engineer-in-Charge on receipt of such a report to deduct such amounts from payments due to the contractor.

14. Disposal of amounts recovered from the Contractor :

The Engineer-in-charge shall arrange payment to workers concerned within **FORTY FIVE** days from receipt of a report from the Inspecting Officer except in cases where the contractor had made an appeal under Regulation, 16 of these Regulations. In cases where there is an appeal, payments of workers, due would be arranged by the Engineer-in-charge, wherever such payments arise, within **THIRTY** days from the date of receipt of the decision of the Regional Labour Commissioner (R.L.C.).

15. Welfare Fund:

All money that are recovered by the Engineer-in-charge by way of workers, due which could not be disbursed to workers within the time–limit prescribed above, due to reasons such as where-about of workers not being known, death of a worker, etc., and also amounts recovered as penalty, shall be credited to a fund to be kept under the custody of B.H.E.L for such benefit and welfare of workmen employed by contractors.

16. Appeal against decision of Inspecting Officer :

Any person aggrieved by a decision of the Inspecting Officer may appeal against such decision to the Regional Labour Commissioner concerned within THIRTY days from the date of the decision, forwarding simultaneously a copy of his appeal to the Engineer-in-charge. The decision of the Regional Labour Commissioner shall be final and binding upon the Contractor and the workmen.

17. Representation of Parties:

i. A workman shall be entitled to be represented in any investigation or enquiry under these Regulations by an Officer of a registered trade union of which the said trade union is affiliated or where the workman is not a member of any registered trade union, by an Officer of a registered trade union connected with, or any other workmen employed in the industry in which the worker is employed.

ii. A Contractor shall be entitled to be represented in any investigation or enquiry under these Regulations by an officer of an association of contractors of which he is a member or by an officer of a Federation of Associations of Contractors to which the said association is affiliated or where the contractor is not a member of any association of employers, connected with, or by any other employer engaged in the industry in which the contractor is engaged.

iii. No party shall be entitled to be represented by a legal practitioner in any investigation or enquiry under these Regulations.

18. Inspection of Books and other Documents:

The Contractor shall allow inspection of the Register and other documents prescribed under these Regulations by Inspecting Officer and the Engineer-in-charge or his authorized representative at any time and by the worker or his agent on receipt of due notice at a convenient time.

19. Interpretation etc.

On any question as to the application, interpretation or effect of the Regulations the decision of the Chief Labour Commissioner or Deputy Chief Labour Commissioner (Central) shall be final and binding.

20. Amendments:

Central Government may, from time to time, add to or amend the Contractor's Labour Regulations and issue such directions as it may consider necessary for the proper implementation of the Contractor's Labour Regulations or for the purpose of removing any difficulty which may arise in the administration thereof, based on which the B.H.E.L., Contractor's Labour Regulations herein contained shall be subject to revision.

MODEL RULES FOR LABOUR WELFARE
(See Condition 20)

1. Definition:

(a) 'Workplace' means a place at which, on an average, twenty or more workers are employed.

(b) 'Large Workplace' means a place at which on an average, 500 or more workers are employed.

2. First Aid: At every workplace, there shall be maintained in a readily accessible place first-aid appliances including an adequate supply of sterilized dressings and sterilized cotton wool as prescribed in the Factory Rules of the State in which the work is carried on. The appliances shall be kept in good order and, in large work places, they shall be placed under the charge of a responsible person who shall be readily available during working hours.

At large workplaces, where hospital facilities are not available within easy distance of the works First Aid posts shall be established and be run by a trained compounder.

Where large workplaces are remotely situated and far away from regular hospitals an indoor ward shall be provided with one bed for every 250 employees.

Where large workplaces are situated in cities, towns or in their suburbs and no beds are considered necessary owing to proximity of city or town hospitals, suitable transport shall be provided to facilitate removal of urgent cases to these hospitals. At other workplaces, some conveyance facilities shall be kept readily available to take injured person or persons suddenly taken seriously ill, to the nearest hospital.

At large workplaces there shall be provided and maintained an ambulance room of the prescribed sizes, containing the prescribed equipment and in the in-charge of such medical and nursing staff as may be prescribed. For this purpose the relevant provisions of the Factory Rules of the State Government of the area where the work is carried on may be taken as the prescribed standard.

3. Accommodation for Labour: The Contractor shall during the progress of the works provide, erect and maintain necessary temporary living accommodation and ancillary facilities for labour at his own expense and to standards and scales as approved by the Engineer-in-charge.

4. Drinking Water: In every workplace, there shall be provided and maintained at suitable places, easily accessible to labour, a sufficient supply of cold water fit for drinking.

Where drinking water is obtained from an intermittent public water supply each workplace shall be provided with storage where drinking water shall be stored. Every water supply storage shall be at a distance of not less than 15 meters from any latrine drain or other source of pollution. Where water has to be drawn from an existing well, which is within such proximity of latrine drain or any other source of pollution, the well shall be properly chlorinated before water is drawn from it for drinking. All such wells shall be entirely closed in and be provided with a trap door which shall be dust and water-proof.

A reliable pump shall be fitted to each covered well, the trap door shall be kept locked and opened only for cleaning or inspection which shall be done at least once a month.

5. Washing and Bathing places: Adequate washing and bathing places shall be provided separately for men and women. Such places shall be kept in clean and drained condition.

6. Scale of Accommodation in Latrines and Urinals: These shall be provided within the precincts of every workplace latrines and urinals in an accessible place, and the accommodation, separately for each of these, shall not be less than at the following scales:

		No.of Seats
a)	Where number of persons does not exceed 50	2
b)	Where number of persons exceed 50 but does not exceed 100	3
c)	For additional persons	3 Per 100 or part thereof.

In particular cases, the Engineer-in-charge shall have the power to increase the requirement, where necessary.

7. Latrines and Urinals: Except in workplaces provided with water flushed latrines connected with a waterborne sewage system, all latrines shall be provided with receptacles on dry-earth system which shall be cleaned at least four times daily and at least twice during working hours and kept in a strictly sanitary condition. Receptacles shall be tarred inside and outside at least once a year.

If women are employed, separate latrine and urinals, screened from those for men and marked in the vernacular in conspicuous letters “For Women only” shall be provided on the scale laid down in rule 6. Those for men shall be similarly marked “For Men only” A poster showing the figure of a man and of a woman shall also be exhibited at the entrance to latrines for each sex. There shall be adequate supply of water close to latrines and urinals.

8. Construction of Latrines: Inside walls shall be constructed of masonry or other non-absorbent material and shall be cement-washed inside and outside at least once a year. The dates of cement washing shall be noted in a register maintained for the purpose and kept available for inspection. Latrines shall have at least thatched roof.

9. Disposal of Excreta: Unless otherwise arranged for by the local sanitary authority, arrangement for proper disposal of excreta by incineration at the workplace shall be made by means of a suitable incinerator approved by the local medical health and municipal or cantonment authorities. Alternatively local excreta may be disposed off by putting a layer of night soil at the Bottom of pucca tank prepared for the purpose and covering it with a 15 cm. layer of waste or refuse and then covering it with a layer of earth for a fortnight (when it will turn into manure).

The contractor shall, at his own expenses, carry out all instruction issued to him by the Engineer-in-charge to effect proper disposal of soil and other conservancy work in respect of Contractor’s work-people or employees on the Site. The Contractor shall be responsible for payment of any charges which may be levied by municipal or cantonment authority for execution of such work on his behalf.

10. Provision of shelters during rest: At every workplace there shall be provided, free of cost, four suitable sheds, two for meals and two others for rest, separately for use of men and women labour. Height of each shelter shall not be less than 3 meters from floor level to lowest part of roof. Sheds shall be kept clean and space provided shall be on the basis of at least 0.5 sq.m. per head.

11. Crèches: At a place at which 20 or more women workers are ordinarily employed, there shall be provided at least one hut for use of children under the age of 6 years of such women. Huts shall not be constructed to a standard lower than that of thatched roof, mud floor and walls with wooden planks spread over mud floor and covered with matting.

Huts shall be provided with suitable and sufficient openings, for light and ventilation. There shall be adequate provision of sweepers to keep the places clean. There shall be two ‘dais’ in attendance. Sanitary utensils shall be provided to the satisfaction of local medical, health and municipal or cantonment authorities. Use of huts shall be restricted to children, their attendants and mothers of children.

When the number of women workers is more than 25 but less than 50, the Contractor shall provide at least one hut and one Dais to look after children of women workers.
Size of crèche (s) shall vary according to the number of women workers employed. Creche(s) shall be properly maintained and necessary equipment like toys, etc. provided.

12. **Canteen:** A cooked food canteen on a moderate scale shall be provided for the benefit of workers wherever it is considered necessary.

13. Planning, setting and erection of the above mentioned structures shall be approved by the Engineer-in-charge, and the whole of such temporary accommodation shall at all times during the progress of the works be kept tidy and in a clean and sanitary condition to the satisfaction of the Engineer-in-Charge and at the Contractor's expense. The Contractor shall conform generally to sanitary requirements of local medical, health and municipal or cantonment authorities and at all times adopt such precautions as may be necessary to prevent soil pollution of the site.

On completion of the works the whole of such temporary structures shall be cleared away, all rubbish burnt, excreta or other disposal pits or trenches filled in and effectively sealed off and the whole of site left clean and tidy to the entire satisfaction of the Engineer-in-Charge, and at the Contractor's expenses.

14. **Anti-malarial precautions:** The Contractor shall, at his own expense, conform to all anti-malarial instructions given to him by the Engineer-in-charge, including filling up of any borrow pits which may have been dug by him.

15. **Enforcement:** The Inspecting Officer mentioned in the Contractors Labour Regulations or any other officer nominated in his behalf by the Engineer-in-Charge shall report to the Engineer-in-Charge all cases of failure on the part of the Contractor and or his sub-contractors to comply with the provisions of these Rules either wholly or in part and the Engineer-in-Charge shall impose such fines and other penalties as are prescribed in the conditions.

B.H.E.L SAFETY CODE
See Condition-20

1. Suitable scaffolds shall be provided for workmen for all work that cannot safely be done from the ground, or from solid construction except such short period of work as can be done safely from ladders. When a ladder is used an extra mazdoor shall be engaged for holding the ladder and if the ladder is used for carrying materials as well, suitable footholds and hand-holds shall be provided on the ladder and the ladder shall be given an inclination not steeper than ¼ to 1 (¼ horizontal and 1 vertical)

2. Scaffolding or staging more than 3.25 meters above the ground or floor, swung or suspended from an overhead support or erected with stationary support, shall have a guard rail properly attached, bolted, braced and otherwise secured atleast 1 meter high above the floor or platform of such scaffolding or staging and extending along the entire length of the outside and ends thereof with only such openings as may be necessary for the delivery of materials. Such scaffolding or staging shall be so fastened as to prevent it from swaying from the building or structure.

3. Working platform, gangways, and stairways shall be so constructed that they do not sag unduly or unequally, and if height of a platform or gangway or stairway is more than 3.25 meters above ground level or floor level, it shall be closely bordered have adequate width and be suitably fenced, as described in 2 above

4. Every opening in floor of a building or in a working platform shall be provided with suitable means to prevent fall of persons or materials by providing suitable fencing or railing with a minimum height of 1 meter.

5. Safe means of access shall be provided to all working platforms and other working places. Every ladder shall be securely fixed. No portable single ladder shall be over 9 meters in length. Width between side rails in a rung, ladder shall in no case be less than 30 cm, for ladders upto and including 3 metres in length. For longer ladders this width shall be increased by atleast 6 mm for each additional 30 cm. of length. Uniform step spacing shall not exceed 30 cm.
Adequate precautions shall be taken to prevent danger from electrical equipment. No materials on any of the sites shall be so stacked or placed as to cause danger or inconvenience to any person or the public. The Contractor shall provide all necessary fencing and lights to protect public from accidents and shall be bound to bear expenses of defence of every suit action or other proceedings at law that may be brought by any person for injury sustained owing to neglect of the above precautions, and pay any damages and costs which may be awarded in any such suit, action or proceeding to any such person or which may with the consent of the Contractor be paid to compromise any claim by any such person.

6. Excavation and Trenching:

   All trenches, 1.5 metres or more in depth, shall at all times be supplied with atleast one ladder for each 30 m length or fraction thereof. Ladder shall be extended from bottom of trench to atleast 1 metre above surface of the ground. Sides of a trench 1.5 metres or more in depth shall be stepped back to give suitable slope or securely held by timber bracing, so as to avoid the danger of sides collapsing. Excavated materials shall not be placed within 1.5 metres of the edge of trench or half the depth of trench, whichever is more. Cutting shall be from top to bottom. Under no circumstances shall undermining or undercutting be done.

7. Demolition: Before any demolition work is commenced and also during the process of the work:

   a. All roads and open areas adjacent to the work site shall either be closed or suitably protected:

   b. No electric cable or apparatus which is liable to be a source of danger over a cable or apparatus used by the operator shall remain electrically charged.

c. All practical steps shall be taken to prevent danger to persons employed, from risk of fire or explosion, or flooding. No floor, roof, or other part of a building shall be so overloaded with debris or materials as to render it unsafe.

8. All necessary personal safety equipment as considered adequate by the Engineer-in-Charge shall be available for use of persons employed on the site and maintained in a condition suitable for immediate use and the Contractor shall take adequate steps to ensure proper use of equipment by those concerned.

a. Workers employed on mixing asphaltic materials cement and lime mortars/ concrete shall be provided with protective footwear and protective gloves.

b. Those engaged in handling any material which is injurious to the eye shall be provided with protective goggles.

c. Those engaged in welding works shall be provided with welder's protective eye-shields.

d. Stone breaker shall be provided with protective goggles and protective clothing and seated at sufficiently safe intervals.

e. When workers are employed in sewers and manholes which are in use, the

Contractor shall ensure that manhole covers are opened and manholes are ventilated atleast for an hour before workers are allowed to get into them. Manholes so opened shall be cordoned off with suitable railing and provided with warning signals or boards to prevent accident to public.

The Contractor shall not employ men below the age of 18 and women on the work of painting with products containing lead in any form. Whenever men above the age of 18 are employed on the work of lead painting, the following precautions shall be taken:

i. No paint containing lead or lead products shall be used except in the form of paste or ready-made paint.

ii. Suitable face masks shall be supplied for use by workers when paint is applied in the form of spray or a surface having lead paint is dry rubbed and scraped.

iii. Overalls shall be supplied by the Contractor to workmen and adequate facilities shall be provided to enable working-painters to wash during on cessation of work.

9. When work is done near any place where there is risk of drowning, all necessary equipment shall be provided and kept ready for use and all necessary steps taken for prompt rescue of any person in danger and adequate provision made for prompt first aid treatment of all injuries likely to be sustained during the course of the work.

10. Use of hoisting machine and tackles including their attachments, anchorage and supports shall conform to the following:

a. i. These shall be of good mechanical construction, sound material and adequate strength and free from defects and shall be kept in good working order.
ii. Every rope used in hoisting or lowering materials or as a means of suspension shall be of durable quality and adequate strength, and free from defects.

b. Every crane driver or hoisting appliance operator shall be properly qualified and no person under the age of 21 years shall be in charge of any hoisting machine including any scaffolding winch or give signals to operator.

c. In case of every hoisting machine and of every chain, ring, hook, shackle, swivel and pulley block used in hoisting or lowering or as means of suspension, safe working load shall be ascertained by adequate means. Every hoisting machine and all gear referred to above shall have the safe working load plainly marked there on, In case of a hoisting machine having a variable safe working load, each safe working load and the conditions under which

it is applicable shall be clearly indicated. No part of any machine or any gear referred to above in this paragraph shall be loaded beyond the safe working load except for the purpose of testing.

d. Incase of departmental machine, safe working load shall be notified by the Engineer-in-Charge. As regards contractor's machine the Contractor shall notify safe working load of each machine to the Engineer-in-Charge whenever he brings it to site of work and get it verified by the Engineer-in-Charge.

11. Motors, gearing, transmission, electric wiring and other dangerous parts of hoisting appliances shall be provided with efficient safeguards; hoisting appliances shall be provided with such means as will reduce to the minimum risk of accidental descent of load. Adequate precautions shall be taken to reduce to the minimum risk of any part of a suspended load becoming accidentally displaced. When workers are employed on electrical installations which are already energized, insulating mats, working apparel such as gloves, sleeves and boots, as may be necessary shall be provided. Workers shall not wear any rings, watches carry keys or other materials which are good conductors of electricity.

12. All scaffolds, ladders and other safety devices mentioned or described herein shall be maintained in a safe condition and no scaffold, ladder or equipment shall be altered or removed while it is in use. Adequate washing facilities shall be provided at or near the places of work.

13. These safety provision shall be brought to the notice of all concerned by display on a notice board at a prominent place at the work spot. Persons responsible for ensuring compliance with the Safety Code shall be named thereon by the Contractor.

14. To ensure effective enforcement of the rules and regulations relating to safety precautions, arrangements made by the Contractor shall be open to inspection by the Engineer-in-Charge or his representatives and the Inspecting Officers as defined in the Contractor's Labour Regulations.

15. Notwithstanding the above conditions 1 to 14, the Contractor is not exempted from the operation of any other Act or Rule in force.

FORM OF REGISTER OF WORKMEN

(Regulation-7)

i. Name and address of the Contractor----------

i. Number and date of the **WORK ORDER & CONTRACT AGREEMENT** ----------

iii. Name and address of the department awarding the contract----------

iv. Nature of the Contract and location of the work----------

v. Duration of the Contract----------

Sl. No	Name and surname of the workers	Age & Sex	Father's / Husband's Name	Nature of emp-loyment Desig-nation.	Permanent / Home address of Employee (Village, Distt. Thana).	Present address	Date of commen-cement of emp-loyment	Date of termina-tion or leaving of emp-loyment	Signature or thumb impression of the employee.	Remarks
1	2	3	4	5	6		7	8	9	10	11

CONTRACTOR

ACCEPTING OFFICER

FORM OF EMPLOYMENT CARD
(Regulation-8)

i Name and Sex of the Worker----------

ii Father's / Husband's Name ----------

iii Address ----------

iv Age or Date of birth----------

v Identification mark ----------

Particulars of next of kin (wife/husband and children, if any, or of dependent next of kin in case the worker has no wife/ husband or child):-

Name----------

Full address of Dependents

(Specify Village, Dist., and State----------

Sl. No	Name & Address of employer (specify Whether a contractor or a sub contractor).	Particulars of location of worksite and description of work done	Total period for which the worker is employed from…….. to……)	Actual number of days worked	Leave taken (No. of days should be specified).	Nature of Work done by the worker.	Wage rate With Parti-culars of unit in Case of Piece work.	Total Wage earned by the Worker during the period shown Under Col.5.	**REMARKS**	Signature of the Employee
1	2	3	4	5	6	7	8	9	10	11

N.B:- For a worker employed at one time on piece-work basis and at another on daily wages, relevant entries in respect of each type of employment should be made separately.

CONTRACTOR

ACCEPTING OFFICER

FORM OF WAGE SLIP
(Regulation-9)

i. Name of the Contractor **----------**

ii. Place ----------

---

1. Name of the worker with
   father's / husband's name.
2. Nature of employment.
3. Wage period.
4. Rate of Wages payable
5. Total attendance / Unit of work done.
6. Dates on which overtime worked
7. Overtime Wages.
8. Gross Wages payable.
9. Total deductions (indicating
   nature of deductions)
10. Net wages payable.

Contractor's Signature /
Thumb impression.

Employees' Signature/
Thumb impression.

FORM OF REGISTER OF FINES

(Regulations No.10 vii)

Sl. No.	Name	Father's / Husband's name	Sex	Department	Nature and date of the offence for which fine imposed	Whether workmen showed cause against fine or not, if so, enter date	Rate of wages	Date and amount of fine imposed	Date on which fine realised	Remarks
1	2	3	4	5	6	7	8	9	10	11

CONTRACTOR **ACCEPTING OFFICER**

FORM OF REGISTER OF WAGES-CUM-MUSTER ROLL

(Regulation – 9)

i. Name and address of the Contractor----------

ii. No. & Date of the Contract Agreement /Work Order----------

iii. Name and address of the department awarding the Contract----------

iv. Nature of the Contract and location of the work----------

v. Duration of the Contract----------

vi. Wage period----------

							Fair Wage Wages payable paid				Overtine Worked			Deduction from wages									
Serial Number	Name and Surname of the wor	Father's/Husband's name	Sex	Designation and Nature of work	Daily attendance (No. of units worked 1,2,3,4,5,6,7.,31)	Total attendance Units	Basic	D.A. & other allowance	Basic	D.A. & other allowance	Date	No.of hours.	Overtime wages earned.	Total wages paid	*Fine	Deduction for damage or loss	House rent	Recovery of advances	Other deductions	Net wages payable	Date of payment	Signature of thumb impression of the worker	Remarks
01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
Reasons to be recorded in Column 24.																							

CONTRACTOR 101 **ACCEPTING OFFICER**

FORM OF REGISTER OF DEDUCTIONS FOR DAMAGES OR LOSS CAUSED TO THE B.H.E.L. BY THE NEGLECT OR DEFAULT OF THE EMPLOYED PERSONS

Regulation No 10 (vii)

Sl.No	Name	Father's Husband's Name	Sex	Department	Damage or loss caused with date	Whether worked showed cause against deduction if so, enter date	Date & amount of deduction imposed	Number of Instal-ment, if any	Date on which total amount realised	Remarks
1	2	3	4	5	6	7	8	9	10	11

CONTRACTOR **ACCEPTING OFFICER**

PERSONNEL PROTECTIVE EQUIPMENT

NYLON SAFETY BELT

1 It shall be made out of Nylon Webbing of width of 45mm.
2 It shall be provided with Friction Buckles and Semi triangular Block Ring
3 It shall be provided with the Life line of 25ft. length of 10 mm dia
4. The Nylon rope with one end directly spliced to the back and the other end thimbleful and spliced with the Hook..
5. It shall be provided with ISI mark/supplied with test certificate.

ACID AND ALKALI RUBBER GOGGLE

1. It shall be made out of good quality thick Rubber with sponge lining inside.
2. It shall be suitable to fit on the face of any person.
3. It shall be fitted with clear, Non shatter able Lenses, or Toughened Lenses, in size 50 mm dia.
4. It shall give protection from splashing of chemicals and acid fumes.
5. It shall be provided with adjustable Elastic Band.

SPECTACLE TYPE SAFETY GOGGLES

1. The Frame should be of conventional type used with good quality cellulose Acetate material with reinforcement on the sides and opaque (black in colour)
2. The Toughened Lens should be an imported on (English, White Toric, plain, Optically Neutral) and should withstand the steel-ball Impact Test with ISI mark.
3. The thickness of the Lens shall be 2.8 mm.
4. The Hinged- type Foldable Wire mesh side – pieces with good Rivets shall be provided.
5. Good; durable, Screws and Hinges on the side – legs with good workmanship must be ensured.
6. There should not be any defect either in the frame, or in the Lens, and the Goggles should be of smooth and fine surface quality.
7. The size of the goggles is to be marked with Nos. 50 & 52 respectively on the inner side of one side – leg.
8. The initials of the Maker shall be embossed on the inner side of the other Leg, to identify the firm.
9. The goggles should be packed in a good , Safety Case. Completely enclosing the goggles with a cleaner.
10. Subjected to 100% inspection.

GUM BOOTS

1. Gum Boots shall be made up of Rubber/PVC material of Duck Back/Tarzan make
2. It shall have inner lining of good quality cotton/cloth
3. It shall have the carbon steel toe cap to the thickness of 1.5mm and should withstand the impact of 14Kgs/m and provided with ISI mark/supplied with test certificate.
4. It shall be covered up to the knee and give protection from splashing of chemicals, oil, water, etc.
5. It shall have the resistance to acids, alkali and oils
6. It shall be provided with ISI mark/supplied with test certificate.

GAS WELDING GOGGLES

1. They shall be made of Bakelite material with smooth finish
2. They shall have the vents on either side for allowing adequate ventilation, but preventing light and dust.
3. They shall have a pair of cups and screw cap arrangements to hold the filter lenses
4. They shall have a pair of filter lenses in size 50mm dia, shade no.6 of DIN specification to filter the IR radiation from the gas welding/cutting operation
5. They shall have two pairs of clear, protective cover(clear glass) in size 50mm dia.
6. They shall have a pair of spring type elastic band with adjustable leather strap

ACID AND ALKALI PROOF RUBBER GLOVES

1. 1.It shall be made up of good quality, thick Rubber in size 14" and 16". Black in colour
2. .It shall give protection against acid and alkali
3. It shall be of five finger type easy wear.

HEAVY DUTY RESPIRATOR

1. It shall be made of soft PVC material so as to withstand normal usage, exposure to moisture
2. The construction shall be suitable to fit the faces of men
3. It shall have a mouth piece with White Cartridge
4. The cartridge shall be containing Sodium Hydroxide with Potassium Hydroxide
5. It shall absorb gas and afford protection against the following Vapours, gases

1.Acetic acid	2. Bromine
3.Carbolic acid	4. Carbon di oxide
5. Chlorine	6. Hydrochloric acid
7. Hydrogen Chloride	8. Iodine
9. Nitrous gases	10. Nitrogen di oxide
11.Phosgene	12. Sulphur di oxide
13.Sulphurated Hydrogen	14. Sulphur Trioxide

6. It shall be provided with a dust mouth piece provided with cotton pad to be provided to filter the respiration dust
7. It shall have a non return inlet valve at the mouth piece, and side outlet valves
8. It shall have adjustable Elastic Strap not less than ¾" width for holding in position without discomfort
9. It shall be light in weight
10. It shall be provided with 3 nos. spare cotton pad along with each respirator
11. It shall be provided with ISI mark/supplied with test certificate

DUST RESPIRATOR

1. It shall be made of soft PVC material so as to withstand normal usage, exposure to moisture
2. The construction shall be suitable to fit the faces of men
3. It shall have a mouth piece with cotton pad to be provided to filter the respiration dust
4. It shall have Non-return inlet valve at the mouthpiece and side outlet respiration
5. It shall have adjustable Elastic Strap not less than ¾" width for holding in position without discomfort
6. It shall be light in weight
7. It shall be provided with 3 nos. spare cotton pad along with each respirator
8. It shall be provided with ISI mark/supplied with test certificate

LIGHT FUME RESPIRATOR

1. It shall be made of soft PVC material so as to withstand normal usage, exposure to moisture
2. The construction shall be suitable to fit the faces of men
3. It shall have a mouth piece with cotton pad and black cartridge containing activated charcoal to filter fumes from paint, oil etc.
4. It shall have Non-return inlet valve at the mouthpiece and side outlet respirable
5. It shall have adjustable Elastic Strap not less than ¾" width for holding in position without discomfort
6. It shall be light in weight
7. Spare cotton pad 3 nos. to be provided along with each respirator
8. It shall be provided with ISI mark/supplied with test certificate

INDUSTRIAL HELMETS

1. The Helmet shall be made of Fiber Glass Di-electric material with narrow brim
2. The surface of the shell shall be natural finish and Light blue colour
3. It shall have a Nape strap adjustable Head band equipped with sweat resisting lining. The width shall not be less than 30mm
4. Inner cushioning which is flexible and non absorber of water shall be provided between the head band the shell
5. It shall have ventilation gap of 10mm to 20mm
6. Inside, the dimension of the head band in the longitudinal direction shall be 20 to 25% greater than the inside dimension of the cross wise direction
7. The shell shall have a clearance of less than 30mm between the inside of the top of the crown and top of the wearer's head
8. The wearing height shall not be less than 80 mm
9. The head band shall be fitted with at least four crown straps each extending from side of the head band to the other. The width of the crown strap shall be 20mm
10. It shall have the leather chin strap , It must with stand the penetration resistance test and shock absorption test provided with ISI mark/supplied with test certificate

SAFETY PRACTICES DURING CONSTRUCTION

CONTENTS

1.0 INTRODUCTION

Safety in Construction Management deserves utmost attention. Construction is widely recognized as one of the accident-prone activities. Most of the accidents are caused by inadequate planning, failure during the construction process and/or because of design deficiencies. Besides property loss, accidents also result in injuries and fatalities to the personnel, same needs to be prevented.

The reasons for accidents during construction activities are related to unique nature of the industry, human behavior, difficult work-site conditions, extended odd duty hours, lack of training & awareness and inadequate safety management. Unsafe working methods, equipment failure and improper housekeeping also tend to increase the accident rate in construction.

Ensuring good quality of materials, equipment and competent supervision along with compliance of standard engineering practices shall go a long way to in built safety into the system.

The objective of this standard is to provide practical guidance on technical and educational framework for safety and health in construction with a view to:

(a) prevent accidents and harmful effects on the health of workers arising from employment in construction;
(b) ensure appropriate safety during implementation of construction;
(c) provide safety practice guidelines for appropriate measures of planning, control and enforcement.

2.0 SCOPE

This document specifies broad guidelines on safe practices to be adhered to during construction activities. However, before commencing any job, specific hazards and its effects should be assessed and necessary corrective/preventive actions should be taken by all concerned. The document is intended only to supplement and not to replace or supersede the prevailing statutory requirements, which shall also be followed as applicable. For Personal Protective Equipment, PPE manual of TLC department shall be referred to. The scope of this document does not include the design aspects and quality checks during construction.

3.0 DEFINITIONS

Definitions of various terminology are given below:

- *Adequate, appropriate or suitable* are used to describe qualitatively or quantitatively the means or method used to protect the worker.

- *Brace:* A structural member that holds one point in a fixed position with respect to another point; bracing is a system of structural members designed to prevent distortion of a structure.

- *By hand:* The work is done without the help of a mechanised tool.

- *Competent Authority:* A stautory agency having the power to issue regulations, orders or other instructions having the force of law.

- *Competent person:* A person possessing adequate qualifications, such as suitable training and sufficient knowledge, experience and skill for the safe performance of the specific work. The competent authorities may define appropriate criteria for the designation of such persons and may determine the duties to be assigned to them.

- *Execution agency:*

  Any physical or legal person, having contractual obligation with the owner, and who employs one or more workers on a construction site

- *Owner:*

  Any physical or legal person for whom construction job is carried out.

  It shall also include owner's designated representative / consultant / nominee / agent, authorized from time to time to act for and on its behalf, for supervising / coordinating the activities of the execution agency.

- *Hazard:* Danger or potential danger.

- *Guard-rail:* An adequately secured rail erected along an exposed edge to prevent persons from falling.

- *Hoist:* A machine, which lifts materials or persons by means of a platform, which runs on guides.

- *Lifting gear:* Any gear or tackle by means of which a load can be attached to a lifting appliance but which does not form an integral part of the appliance or load.

- *Lifting appliance:* Any stationary or mobile appliance used for raising or lowering persons or loads.

- *Means of access or egress:* Passageways, corridors, stairs, platforms, ladders and any other means for entering or leaving the workplace or for escaping in case of danger.

- *Scaffold:* Any fixed, suspended or mobile temporary structure supporting workers and material or to gain access to any such structure and which is not a lifting appliance as defined above.

- *Toe-board:* A barrier placed along the edge of a scaffold platform, runway, etc., and secured there to guard against the slipping of persons or the falling of material.

- *Worker:* Any person engaged in construction activity.

- *Workplace:* All places where workers need to be or to go by reason of their work.

4.0 GENERAL DUTIES

4.1 GENERALDUTIESOF EXECUTION AGENCIES

4.1.1 Execution agency should:

i) Provide means and organization to comply with the safety and health measures required at the workplace.

ii) Provide and maintain workplaces, plant, equipment, tools and machinery and organize construction work so that, there is no risk of accident or injury to health of workers. In particular, construction work should be planned, prepared and undertaken so that:

(a) Dangers, liable to arise at the workplace, are prevented;
(b) Excessively or unnecessarily strenuous work positions and movements are avoided;
(c) Organization of work takes into account the safety and health of workers;
(d) Materials and products used are suitable from a safety and health point of view;
(e) Working methods are adopted to safeguard workers against the harmful effects of chemical, physical and biological agents.

iii) Arrange for periodic safety inspections by competent persons of all buildings, plant, equipment, tools, machinery, workplaces and review of systems of work, regulations, standards or codes of practice. The competent person should examine and ascertain the safety of construction machinery and equipment.

iv) Provide such supervision to ensure that workers perform their work with due regard to safety and health of theirs as well as that of others.

v) Employ only those workers who are qualified, trained and suited by their age, physique, state of health and skill.

vi) Satisfy themselves that all workers are informed and instructed in the hazards connected with their work and environment and trained in the precautions necessary to avoid accidents and injury to health.

vii) Ensure that buildings, plant, equipment, tools, machinery or workplaces in which a dangerous defect has been found should not be used until the defect has been rectified.

viii) Organize for and remain always prepared to take immediate steps to stop the operation and evacuate workers as appropriate, where there is an imminent danger to the safety of workers.

ix) Establish a checking system by which it can be ascertained that all the members of a shift, including operators of mobile equipment, have returned to the camp or base at the close of work on dispersed sites and where small groups of workers operate in isolation.

x) Provide appropriate first aid, training and welfare facilities to workers as per various statutes like the Factories Act, 1948 etc. and, whenever collective measures are not feasible or are insufficient, provide and maintain personal protective equipment and clothing in line with the requirement as per PPE Manual of TLC Department. They should also provide access to workers to occupational health services.

xi) Educate workers about their right and the duty at any workplace to participate in ensuring safe working conditions to the extent of their control over the equipment and methods of work and to express views on working procedures adopted as may affect safety and health.

xii) Ensure that except in an emergency, workers, unless duly authorized, should not interfere with, remove, alter or displace any safety device or other appliance furnished for their protection or the protection of others, or interfere with any method or process adopted with a view to avoiding accidents and injury to health.

xiii) Ensure that workers do not operate or interfere with plant and equipment that they have not been

duly authorised to operate, maintain or use.

xiv) Ensure that workers do not sleep, rest or cook etc in dangerous places such as scaffolds, railway tracks, garages, confined spaces or in the vicinity of fires, dangerous or toxic substances, running machines or vehicles and heavy equipment etc.

xvii) Obtain the necessary clearance / permits as required and specified by owner

4.2 GENERAL DUTIES OF OWNERS

4.2.1 Owners should:

i) co-ordinate or nominate a competent person to co-ordinate all activities relating to safety and health on their construction projects;
ii) Inform all contractors on the project of special risks to health and safety;
iii) Ensure that executing agency is aware of the owner's requirements and the executing agency's responsibilities with respect to safetry practices before starting the job.

5.0 SAFETY PRACTICES AT WORK PLACES

5.1. GENERAL PROVISIONS

5.1.1 All openings and other areas likely to pose danger to workers should be clearly indicated.

5.1.2 Workers & Supervisors should use the safety helmet and other requisite Personal Protective Equipment according to job & site requirement. They should be trained to use personal protective equipment.

5.1.3 Never use solvents, alkalis and other oils to clean the skin.

5.1.4 Lift the load with back straight and knees bent as far as possible. Seek the help in case of heavy load.

5.1.5 Ensure the usage of correct and tested tools and tackles. Don't allow the make shift tools and tackles.

5.1.6 No loose clothing should be allowed while working near rotating equipment or working at heights.

5.2 MEANS OF ACCESS AND ENGRESS

Adequate and safe means of access (at least two, differently located) to and egress from all workplaces should be provided. Same should be displayed and maintained.

5.3 HOUSEKEEPING

5.3.1 Ensure:

i) proper storage of materials and equipment;
ii) removal of scrap, inflammable material, waste and debris at appropriate intervals.

5.3.2 Removal of loose materials, which are not required for use, to be ensured. Accumulation of these at the site can obstruct means of access to and egress from workplaces and passageways.

5.3.3 Workplaces and passageways, that are slippery owing to oil, grease or other causes, should be cleaned up or strewn with sand, sawdust, ash etc.

5.4 PRECAUTIONS AGAINST THE FALL OF MATERIALS & PERSONS AND COLLAPSE OF STRUCTURES

5.4.1 Precautions should be taken such as the provision of fencing, look-out men or barriers to protect any person against injury by the fall of materials, or tools or equipment being raised or lowered.

5.4.2 Where necessary to prevent danger, guys, stays or supports should be used or other effective precautions should be taken to prevent the collapse of structures or parts of structures that are being erected, maintained, repaired, dismantled or demolished.

5.4.4 All openings through which workers are liable to fall should be kept effectively covered or fenced and displayed prominently.

5.4.5 As far as practicable, guardrails and toe-boards should be provided to protect workers from falling from elevated workplaces.

5.5 PREVENTION OF UNAUTHORISED ENTRY

5.5.1 Construction sites located in built-up areas and alongside vehicular and pedestrian traffic routes should be fenced to prevent the entry of unauthorized persons.

5.5.2 Visitors should not be allowed access to construction sites unless accompanied by or authorised by a competent person and provided with the appropriate protective equipment.

5.6 FIRE PREVENTION AND FIRE FIGHTING

5.6.1 All necessary measures should be taken by the executing agency and owner to:

i) avoid the risk of fire;
ii) control quickly and efficiently any outbreak of fire;
iii) bring out a quick and safe evacuation of persons.
iv) Inform unit/fire station control room, where construction work is carried out within existing operating area.

5.6.2 Combustible materials such us packing materials, sawdust, greasy/oily waste and scrap wood or plastics should not be allowed to accumulate in workplaces but should be kept in closed metal containers in a safe place.

5.6.3 Places where workers are employed should, if necessary to prevent the danger of fire, be provided with:

i) suitable and sufficient fire-extinguishing equipment, which should be easily visible and accessible;
ii) an adequate water supply at sufficient pressure meeting the requirements.

5.6.4 To guard against danger at places having combustible material, workers should be trained in the action to be taken in the event of fire, including the use of means of escape.

5.6.5 At sites having combustible material, suitable visual signs should be provided to indicate clearly the direction of escape in case of fire.

5.6.6 Means of escape should be kept clear at all times. Escape routes should be frequently inspected particularly in high structures and where access is restricted.

5.7 LIGHTING

5.7.1 Where natural lighting is not adequate, working light fittings or portable hand-lamps should be provided at workplace on the construction site where a worker will do a job.

5.7.2 Emergency lighting should be provided for personnel safety during night time to facilitate standby lighting source, if normal system fails.

5.7.2 Artificial lighting should not produce glare or disturbing shadows.

5.7.3 Lamps should be protected by guards against accidental breakage.

5.7.4 The cables of portable electrical lighting equipment should be of adequate size & characteristics for the power requirements and of adequate mechanical strength to withstand severe conditions in construction operations.

5.8 PLANT, MACHINERY, EQUIPMENT AND HAND TOOLS

5.8.1 General Provisions

i) Plant, machinery and equipment including hand tools, both manual and power driven, should:

a) be of proper design and construction, taking into account health, Safety and ergonomic principles.
b) be maintained in good working order;
c) be used only for work for which they have been designed.

d) be operated only by workers who have been authorized and given appropriate training.
e) be provided with protective guards, shields or other devices as required.

iii) Adequate instructions for safe use should be provided.

iii) Safe operating procedures should be established and used for all plant, machinery and equipment.

iv) Operators of plant, machinery and equipment should not be distracted while work is in progress.

v) Plant, machinery and equipment should be switched off when not in use and isolated before any adjustment, clearing or maintenance is done.

vi) Where trailing cables or hose pipes are used they should be kept as short as practicable and not allowed to create a hazard.

vii) All moving parts of machinery and equipment should be enclosed or adequately guarded.

viii) Every power-driven machine and equipment should be provided with adequate means, immediately accessible and readily identifiable to the operator, of stopping it quickly and preventing it from being started again inadvertently.

ix) Operators of plant, machinery, equipment and tools should be provided with PPEs, including where necessary, suitable ear protection.

5.8.2 Hand tools

i) Hand tools should be repaired by competent persons.

ii) Heads of hammers and other shock tools should be dressed or ground to a suitable radius on the edge as soon as they begin to mushroom or crack.

iii) When not in use and while being carried or transported sharp tools should be kept in sheaths, shields, chests or other suitable containers.

iv) Only insulated or non-conducting tools should be used on or near live electrical installations.

v) Only non-sparking tools should be used near or in the presence of flammable or explosive dusts or vapours.

5.8.3 Pneumatic Tools

i) Operating triggers on portable pneumatic tools should be:

a) so placed as to minimize the risk of accidental starting of the machine.
b) so arranged as to close the air inlet valve automatically when the pressure of the operator's hand is removed.

ii) Hose and hose connections for compressed air supply to portable pneumatic tools should be:

a) designed and tested for the pressure and service for which they are intended;
b) fastened securely on the pipe outlet and equipped with the safety chain, as appropriate.

iv) Pneumatic shock tools should be equipped with safety clips or retainers to prevent dies and tools from being accidentally expelled from the barrel.

v) Pneumatic tools should be disconnected from power and the pressure in hose lines released before any adjustment or repair is made.

5.8.4 Electrical Tools

i) Low voltage portable electrical tools should generally be used.
ii) All electrical tools should be earthed, unless they are "all insulated" or "double insulated" tools which do not require earthing.

iii) All electrical tools should get inspected and maintained on a regular basis by a competent electrician and complete records kept.

5.8.5 Engines

i) Engines should:

a) be installed so that they can be started safely and the maximum safe speed cannot be exceeded.
b) have controls for limiting speed.
c) have devices to stop them from a safe place in an emergency.

ii) IC engines should not be run in confined spaces unless adequate exhaust ventilation is provided.

iii) When IC engines are being fuelled:the engine should be shut off.
a) care should be taken to avoid spilling fuel;
b) no person should smoke or have an naked light in the vicinity.
c) a fire extinguisher should be kept readily available.

iv) Secondary fuel reservoir should be placed outside the engine room.

6.0 CONSTRUCTION ACTIVITIES

The various common activities in construction are as under:

- Excavation
- Scaffolding, Platforms & Ladders
- Structural Work, Laying of Reinforcement & Concreting
- Road Work
- Cutting /Welding
- Working in Confined Space
- Working at Heights
- Handling & Lifting Equipments
- Vehicle Movement
- Demolition
- Masonry Works

The safe practices to be followed during the implementation of above construction activities are given below:

6.2 SCAFFOLDING, PLATFORMS & LADDERS

6.2.1 Metal as material of construction

i) A scaffold should be provided and maintained or other equally safe and suitable provision should be made where work cannot safely be done on or from the ground or from part of a building or other permanent structure.

ii) Scaffolds should be provided with safe means of access, such as stairs, ladders or ramps. Ladders should be secured against inadvertent movement.

iii) Every scaffold should be constructed, erected and maintained so as to prevent collapse or accidental displacement when in use.

iv) Every scaffold and part thereof should be constructed :

(a) in such a way so as not to cause hazards for workers during erection and dismantling;
(b) in such a way so as guard rails and other protective devices, platforms, ladders, stairs or ramps can be easily put together;
(c) with sound material and of requisite size and strength for the purpose for which it is to be used and maintained in a proper condition.

v) Boards and planks used for scaffolds should be protected against splitting.

vi) Materials used in the construction of scaffolds should be stored under good conditions and apart from any material unsuitable for scaffolds.

vii) Couplers should not cause deformation in tubes. Couplers should be made of drop forged steel or equivalent material.

viii) Tubes should be free from cracks, splits and excessive corrosion and be straight to the eye, and tube ends cut cleanly square with the tube axis.

ix) Scaffolds should be designed for their maximum load as per relevant code.

x) Scaffolds should be adequately braced.

xi) Scaffolds which are not designed to be independent should be rigidly connected to the building at designated vertical and horizontal places.

xii) A scaffold should never extend above the highest anchorage to an extent which might endanger its stability and strength.

xiii) Loose bricks, drainpipes, chimney-pots or other unsuitable material should not be used for the construction or support of any part of a scaffold.

xiv) Scaffolds should be inspected and certified:

(a) before being taken into use;
(b) at periodic intervals thereafter as prescribed for different types of scaffolds;
(c) after any alteration, interruption in use, exposure to weather or seismic conditions or any other occurrence likely to have affected their strength or stability.

xv) Inspection should more particularly ascertain that:

(a) the scaffold is of suitable type and adequate for the job;
(b) materials used in its construction are sound and of sufficient strength;
(c) it is of sound construction and stable;
(d) that the required safeguards are in position.

xvi) A scaffold should not be erected, substantially altered or dismantled except by or under the supervision.

xvii) Every scaffold should be maintained in good and proper condition, and every part should be kept fixed or secured so that no part can be displaced in consequence of normal use.

6.2.2 Lifting appliances on scaffolds

i) When a lifting appliance is to be used on a scaffold:

(a) the parts of the scaffold should be carefully inspected to determine the additional strengthening and other safety measures required;
(b) any movement of the scaffold members should be prevented;
(c) if practicable, the uprights should be rigidly connected to a solid part of the building at the place where the lifting appliance is erected.

6.2.3 Prefabricated scaffolds

i) In the case of prefabricated scaffold systems, the instructions provided by the manufacturers or suppliers should be strictly adhered to. Prefabricated scaffolds should have adequate arrangements for fixing bracing.

ii) Frames of different types should not be intermingled in a single scaffold.

iii) Scaffolding shall be erected on firm and level ground.

iv) All members of metal scaffolding shall be checked periodically to screen out defective / rusted members. All joints should be properly lubricated for easy tightening.

v) Entry to scaffolding should be restricted.

vi) Erection, alteration and removal shall be done under supervision of experienced personnel.

vii) Use of barrels, boxes, loose bricks etc., for supporting platform shall not be permitted.

viii) Each supporting member of platform shall be securely fastened and braced

ix) Where planks are butt-joined, two parallel putlogs shall be used, not more than 100mm apart, to give support to each plank.

x) Platform plank shall not project beyond its end support to a distance exceeding 4 times the thickness of plank, unless it is effectively secured to prevent tipping. Cantilever planks should be avoided.

xi) The platform edges shall be provided with 150mm high toe board to eliminate hazards of tools or other objects falling from platform.

xii) Erect ladders in the “four up-one out position”

xiii) Lash ladder secured with the structure.

xiv) Using non-slip devices, such as, rubber shoes or pointed steel ferules at the ladder foot, rubber wheels at ladder top, fixing wooden battens, cleats etc.

xv) When ladder is used for climbing over a platform, the ladder must be of sufficient length, to extend at least one meter above the platform, when erected against the platform in “four up-one out position.”

xvi) Portable ladders shall be used for heights not more than 4mt. Above 4mt flights, fixed ladders shall be provided with at least 600 mm landings at every 6mt or less.

xvii) The width of ladder shall not be less than 300mm and rungs shall be spaced not more than 300mm.

xviii) Every platform and means of access shall be kept free from obstruction.

xix) If grease, mud, gravel, mortar etc., fall on platform or scaffolds, these shall be removed immediately to avoid slippage.

xx) Workers shall not be allowed to work on scaffolds during storms or high wind. After heavy rain or storms, scaffolds shall be inspected before reuse.

xxi) Don't overload the scaffolding. Remove excess material and scrap immediately.

xxii) Dismantling of scaffolds shall be done in a pre-planned sequential manner.

6.2.4 Suspended scaffolds / boatswain's chair

i) In addition to the requirements for scaffolds in general as regards soundness, stability and protection against the risk of falls, suspended scaffolds should meet the following specific requirements.

(a) platforms should be designed and built with dimensions that are compatible with the stability of the structure as a whole, especially the length;
(b) the number or anchorage should be compatible with the dimensions of the platform;
(c) the safety of workers should be safeguarded by an extra rope having a point of attachment independent of the anchorage arrangements of the scaffold;
(d) the anchorage and other elements of support of the scaffold should be designed and built in such a way as to ensure sufficient strength;
(e) the ropes, winches, pulleys or pulley blocks should be designed, assembled, used and maintained according to the requirements established for lifting gear adapted to the lifting of persons according to national laws and regulations;
(f) Before use, the whole structure should be checked by a competent person.

6.2.5 Bamboo / Casuarina Scaffolding

i) In general, it should be avoided as far as possible.

ii) For construction and maintenance of residential and office buildings, bamboo / Casuarinas scaffold, if used, should conform to provisions given in IS-3696 (Part 1)-1987.

6.3 STRUCTURAL WOR

6.3.1 General provisions

i) The erection or dismantling of buildings, structures, civil engineering works, formwork, false work and shoring should be carried out by trained workers only under the supervision of a competent person.

ii) Precautions should be taken to guard against danger to workers arising from any temporary state of weakness or instability of a structure.

iii) Formwork, false work and shoring should be so designed, constructed and maintained that it will safely support all loads that may be imposed on it.

iv) Formwork should be so designed and erected that working platforms, means of access, bracing and means of handling and stabilizing are easily fixed to the formwork structure.

6.3.2. Erection and dismantling of steel and prefabricated structures

i) The safety of workers employed on the erection and dismantling of steel and prefabricated structures should be ensured by appropriate means, such as provision and use of:

(a) ladders, gangways or fixed platforms;
(b) platforms, buckets, boatswain's chairs or other appropriate means suspended from lifting appliances;
(c) safety harnesses and lifelines, catch nets or catch platforms;

ii) Steel and prefabricated structures should be so designed and made that they can be safely transported and erected.

iii) In addition to the need for the stability of the part when erected, the design should explicitly take following into account:

(a) the conditions and methods of attachment in the operations of transport, storing and temporary support during erection or dismantling as applicable;

(b) Methods for the provision of safeguards such as railings and working platforms, and, when necessary, for mounting them easily on the structural steel or prefabricated parts.

iv) The hooks and other devices built in or provided on the structural steel or prefabricated parts that are required for lifting and transporting them should be so shaped, dimensioned and positioned as:

(a) to withstand with a sufficient margin the stresses to which they are subjected;
(b) Not to set up stresses in the part that could cause failures, or stresses in the structure itself not provided for in the plans, and be designed to permit easy release from the lifting appliance. Lifting points for floor and staircase units should be located (recessed if necessary) so that they do not protrude above the surface;
(c) To avoid imbalance or distortion of the lifted load.

v) Storeplaces should be so constructed that:

(a) there is no risk of structural steel or prefabricated parts falling or overturning;
(b) storage conditions generally ensure stability and avoid damage having regard to the method of storage and atmospheric conditions;
(c) racks are set on firm ground and designed so that units cannot move accidentally.

vi) While they are being stored, transported, raised or set down, structural steel or prefabricated parts should not be subjected to stresses prejudicial to their stability.

vii) Every lifting appliance should:

(a) be suitable for the operations and not be capable of accidental disconnection;
(b) be approved or tested as per statutory requirement.

viii) Lifting hooks should be of the self-closing type or of a safety type and should have the maximum permissible load marked on them.

ix) Tongs, clamps and other appliances for lifting structural steel and prefabricated parts should:

(a) be of such shape and dimensions as to ensure a secure grip without damaging the part;
(b) be marked with the maximum permissible load in the most unfavourable lifting conditions.

x) Structural steel or prefabricated parts should be lifted by methods or appliances that prevent them from spinning accidentally.

xi) When necessary to prevent danger, before they are raised from the ground, structural steel or prefabricated parts should be provided with safety devices such as railings and working platforms to prevent falls of persons.

xii) While structural steel or prefabricated parts are being erected, the workers should be provided with appliances for guiding them as they are being lifted and set down, so as to avoid crushing of hands and to facilitate the operations. Use of such appliances should be ensured.

xiii) A raised structural steel or prefabricated part should be so secured and wall units so propped that their stability cannot be imperiled, even by external agencies such as wind and passing loads before its release from the lifting appliance.

xiv) At work places, instruction should be given to the workers on the methods, arrangements and means required for the storage, transport, lifting and erection of structural steel or prefabricated parts, and, before erection starts, a meeting of all those responsible should be held to discuss and confirm the requirements for safe erection.

xv) During transportation within the construction area, attachments such as slings and stirrups mounted on structural steel or prefabricated parts should be securely fastened to the parts.

xvi) Structural steel or prefabricated parts should be so transported that the conditions do not affect the stability of the parts or the means of transport result in jolting, vibration or stresses due to blows, or loads of material or persons.

xvii) When the method of erection does not permit the provision of other means of protection against fall of persons, the workplaces should be protected by guardrails, and if appropriate by toe-boards.

xviii) When adverse weather conditions such as snow, ice and wind or reduced visibility entail risks of accidents, the work should be carried on with particular care, or, if necessary, interrupted.

xix) Structures should not be worked on during violent storms or high winds, or when they are covered with ice or snow, or are slippery from other causes.

xx) If necessary, to prevent danger, structural steel parts should be equipped with attachments for suspended scaffolds, lifelines or safety harnesses and other means of protection.

xxi) The risks of falling, to which workers moving on high or sloping girders are exposed, should be limited by all means of adequate collective protection or, where this is impossible, by the use of a safety harness that is well secured to a strong support.

xxii) Structural steel parts that are to be erected at a great height should as far as practicable be assembled on the ground.

xxiii) When structural steel or prefabricated parts are being erected, a sufficiently extended area underneath the workplace should be barricaded or guarded

xxiv) Steel trusses that are being erected should be adequately shored, braced or guyed until they are permanently secured in position.

xxv) Load-bearing structural member should not be dangerously weakened by cutting, holing or other means.

xxvi) Structural members should not be forced into place by the hoisting machine while any worker is in such a position that he could be injured by the operation.

xxvii) Open-web steel joists that are hoisted singly should be directly placed in position and secured against dislodgment.

6.4 CUTTING/WELDING

6.5.1 Common hazards involved in welding/cutting are sparks, molten metal, flying particles, harmful light rays, electric shocks etc. Following precautions should be taken after getting safe work permit in form 310-016 : -

i) A dry chemical type fire extinguisher shall be made available in the work area.

ii) Adequate ventilation shall be ensured by opening manholes and fixing a shield or forced circulation of air etc, while doing a job in confined space.

iii) Ensure that only approved and well-maintained apparatus, such as torches, manifolds, regulators or pressure reducing valves, and acetylene generators, be used.

iv) All covers and panels shall be kept in place, when operating an electric Arc welding machine.

v) The work piece should be connected directly to Power supply, and not indirectly through pipelines/structures/equipments etc.

vi) The welding receptacles shall be rated for 63 A suitable for 415V, 3-Phase system with a scraping earth. Receptacles shall have necessary mechanical interlocks and earthing facilities.

vii) All cables, including welding and ground cables, shall be checked for any worn out or cracked insulation before starting the job. Ground cable should be separate without any loose joints.

viii) Cable coiling shall be maintained at minimum level, if not avoidable.

ix) An energised electrode shall not be left unattended.

x) The power source shall be turned off at the end of job.

xi) All gas cylinders shall be properly secured in upright position.

xii) Acetylene cylinder shall be turned and kept in such a way that the valve outlet points away from oxygen cylinder.

xiii) Acetylene cylinder key for opening valve shall be kept on valve stem, while cylinder is in use, so that the acetylene cylinder could be quickly turned off in case of emergency. Use flash back arrestors to prevent back-fire in acetylene/oxygen cylinder.

xiv) When not in use, valves of all cylinders shall be kept closed.

xv) All types of cylinders, whether full or empty, shall be stored at cool, dry place under shed.

xvi) Forced opening of any cylinder valve should not be attempted.

xvii) Lighted gas torch shall never be left unattended.

xviii) Store acetylene and oxygen cylinders separately.

xix) Store full and empty cylinders separately.

xx) Avoid cylinders coming into contact with heat.

xxi) Cylinders that are heavy or difficult to carry by hand may be rolled on their bottom edge but never dragged.

xxii) If cylinders have to be moved, be sure that the cylinder valves are shut off.

xxiii) Before changing torches, shut off the gas at the pressure reducing regulators and not by crimping the hose.

xxiv) Do not use matches to light torches, use a friction lighter.

xxv) Move out any leaking cylinder immediately.

xxvi) Use trolleys for oxygen & acetylene cylinder and chain them.

xxvii) Always use Red hose for acetylene and other fuel gases and Black for oxygen, and ensure that both are in equal length.

xxviii) Ensure that hoses are free from burns, cuts and cracks and properly clamped.

xxix) Avoid dragging hoses over sharp edges and objects

xxx) Do not wrap hoses around cylinders when in use or stored.

xxxi) Protect hoses from flying sparks, hot slag, and other hot objects.

xxxii) Lubricants shall not be used on Ox-fuel gas equipment.

xxxiii) During cutting/welding, use proper type goggles/face shields.

6.5 WORKING IN CONFINED SPACES

6.6.1 Following safety practices for working in confined space like towers, columns, tanks and cellars should be followed in addition to the safety guidelines for specific jobs like scaffolding, cutting/welding etc.

i) Entry inside the confined area and to carry out any job should be done after issuance of valid permit only, in line with form 310-017.

ii) Ensure proper and accessible means of exit before entry inside a confined space.

iii) The number of persons allowed inside the area should be limited to avoid overcrowding.

iv) When the work is going on in the confined space, there should always be one man standby at the nearby man way.

v) Before entering inside the area - underground or located at lower elevation, probability of dense vapours accumulating nearby should also be considered in addition to inside the vessel.

vi) Ensure requisite O_2 level before entry in the confined space and monitor level periodically or other wise use respiratory devices.

vii) Check for no Hydrocarbon or toxic substances before entry and monitor level periodically or use requisite Personal Protective Equipment.

viii) Ensure adequate ventilation or use respiratory devices.

ix) Depending upon need, necessary respirator system, gas masks and suit shall be worn by everyone entering confined space. In case of sewer, manholes or in the confined area where there is a possibility of toxic or inert gas, gas masks shall be used by everyone while entering.

x) Barricade the confined spaces

xi) Use 24V flameproof lamp fittings only for illumination.

xii) Use tools with air motors or electric tools with maximum voltage of 24V.

xiii) House keeping shall be well maintained.

xiv) Safety helmet, safety shoes and safety belt shall be worn by everyone entering the confined space.

xv) Don't wear loose clothing while working in a confined space.

xvi) The gas cylinders used for cutting/welding shall be kept outside.

xvii) All cables, hoses, welding equipment etc., shall be removed from confined space at end of each work day, even if the work is to be resumed in the same space the next day.

xviii) To the extent possible sludge shall be cleared and removed from outside before entering.

xix) No naked light or flame or hot work such as welding, cutting and soldering should be permitted inside a confined space or area unless it has been made completely free of the flammable atmosphere, tested and found safe by a competent person. Only non-sparking tools and flameproof hand lamps protected with guard and safety torches should be used inside such confined space or area for initial inspection, cleaning or other work required to be done for making the area safe.

xx) Communication should be always maintained between the worker and the attendant.

6.7 WORKING AT HEIGHTS

6.7.1 General Provision

i) While working at a height of more than 2 meters, ISI approved safety belt shall be used.

ii) While working at a height of more than 2 meters, permit should be issued by competent person in form 310-015, before commencement of the job.

iii) Worker should be well trained on usage of safety belt including its proper usage at the time of ascending/descending.

iv) All tools should be carried in tool kits to avoid their falling.

v) If the job is on fragile/sloping roof, roof walk ladders shall be used, in addition to getting safe work permit in form 310-012.

vi) Provide lifeline wherever required.

vii) Additional safety measures like providing Fall Arrestor type Safety belt, safety net should be provided depending upon site conditions, job requirements.

viii) Keep working area neat and clean. Remove scrap material immediately.

ix) Don't throw or drop material/equipment from height.

x) Avoid jumping from one member to another. Use proper passageway.

xi) Keep both hands free while climbing. Don't try to bypass the steps of the ladder.

xii) Try to maintain calm at height. Avoid over exertion.

xiii) Avoid movements on beam.

xiv) Elevated workplaces including roofs should be provided with safe means of access and egress such as stairs, ramps or ladders.

6.7.2 Roof Work

i) All roof-work operations should be pre-planned and properly supervised.

ii) Roof work should only be undertaken by workers who are physically and psychologically fit and have the necessary knowledge and experience for such work.

iii) Work on roofs shouldn't be carried on in weather conditions that threaten the safety of workers.

iv) Crawling boards, walkways and roof ladders should be securely fastened to a firm structure.

v) Roofing brackets should fit the slope of the roof and be securely supported.

vi) Where it is necessary for a person to kneel or crouch near the edge of the roof, necessary precautions should be taken.

vii) On a large roof where work have to be carried out at or near the edge, a simple barrier consisting of crossed scaffold tubes supporting a tubing guardrail may be provided.

viii) All covers for openings in roofs should be of substantial construction and be secured in position.

ix) Roofs with a pitch of more than 10 should be treated as sloping.

x) When work is being carried out on sloping roof, sufficient and suitable crawling boards or roof ladders should be provided and firmly secured in position.

xi) During extensive work on the roof, strong barriers or guardrails and toe-boards should be provided to stop a person from falling off the roof.

xii) Where workers are required to work on or near roof or other places covered with fragile material, through which they are liable to fall, they should be provided with suitable roof ladders or crawling boards strong enough and when spanning across the supports for the roof covering to support those workers.

xiii) A minimum of two boards should be provided so that it is not necessary for a person to stand on a fragile roof to move a board or a ladder, or for any other reason.

6.8 HANDLING AND LIFTING EQUIPMENT:

6.8.1 General Provisions

Following are the general guidelines to be followed with regard to all types of handling and lifting equipment in addition to the guidelines for specific type of equipments dealt later on.

i) There should be a well-planned safety programme to ensure that all the lifting appliances and lifting gear are selected, installed, examined, tested, maintained, operated and dismantled with a view to preventing the occurrence of any accident;

ii) All lifting appliances shall be examined by competent persons at frequencies as specified in "The Factory act".

iii) Check thoroughly quality, size and condition of all lifting tools like chain pulley blocks, slings, U-clamps, D-shackles etc. before putting them in use.

iv) Safe lifting capacity of all lifting & handling equipment, tools and shackles should be got verified and certificates obtained from competent authorities before its use. The safe working load shall be marked on them.

v) Check periodically the oil, brakes, gears, horns and tyre pressure of all moving equipments like cranes, forklifts, trailers etc as per manufacturer's recommendations.

vi) Check the weights to be lifted and accordingly decide about the crane capacity, boom length and angle of erection.

vii) Allow lifting slings as short as possible and check packing at the friction points.

viii) While lifting/placing of the load, no unauthorised person shall remain within the radius of the boom and underneath the load.

ix) While loading, unloading and stacking of pipes, proper wedges shall be placed to prevent rolling down of the pipes.

x) Control longer jobs being lifted up from both ends.

xi) Only trained operators and riggers should carry out the job. While the crane is moving or lifting the load, the trained rigger should be there for keeping a vigil against hitting any other object.

xii) During high wind conditions and nights, lifting of heavy equipments should be avoided. If unavoidable to do erection in night, operator and rigger should be fully trained for night signaling. Also proper illumination should be there.

xiii) Allow crane to move on hard, firm and leveled ground.

xiv) When crane is in idle condition for long periods or unattended, crane boom should either be lowered or locked as per manufacturer's guidelines.

xv) Hook and load being lifted shall remain in full visibility of crane operators, while lifting, to the extent possible.

xvi) Don't allow booms or other parts of crane to come within 3 meters reach of overhead electrical cables.

xvii) No structural alterations or repairs should be made to any part of a lifting appliance, which may affect the safety of the appliance without the permission and supervision of the competent person.

6.8.2 Hoists

i) Hoist shafts should be enclosed with rigid panels or other adequate fencing at:

(a) ground level on all sides;
(b) all other levels at all points at which access is provided;
(c) all points at which persons are liable to be struck by any moving part.

ii) The enclosure of hoist shafts, except at approaches should extend where practicable at least 2mt above the floor, platform or other place to which access is provided except where a lesser height is sufficient to prevent any person falling down the hoist way and there is no risk of any person coming into contact with any moving part of the hoist, but in no case should the enclosure be less than 1mt in height.

iii) The guides of hoist platforms should offer sufficient resistance to bending and, in the case of jamming by a safety catch, to buckling.

iv) Where necessary to prevent danger, adequate covering should be provided above the top of hoist shafts to prevent material falling down them.

v) Outdoor hoist towers should be erected on firm foundations, and securely braced, guyed and anchored.

vi) A ladder way should extend from the bottom to the top of outdoor hoist towers, if no other ladder way exists within easy reach.

vii) Hoisting engines should be of ample capacity to control the heaviest load that they will have to move.

viii) Hoists should be provided with devices that stop the hoisting engine as soon as the platform reaches its highest stopping place.

ix) Winches should be so constructed that the brake is applied when the control handle is not held in the operating position.

x) It should not be possible to set in motion from the platform a hoist, which is not designed for the conveyance of persons.

xi) Winches should not be fitted with pawl and ratchet gears on which the pawl must be disengaged before the platform is lowered.

xii) Hoist platforms should be capable of supporting the maximum load that they will have to carry with a safety factor.

xiii) Hoist platforms should be equipped with safety gear that will hold the platform with the maximum load if the hoisting rope breaks.

xiv) If workers have to enter the cage or go on the platform at landings there should be a locking arrangement preventing the cage or platform from moving while any worker is in or on it.

xv) On sides not used for loading and unloading, hoist platforms should be provided with toe-boards and enclosures of wire mesh or other suitable material to prevent the fall of parts of loads.

xvi) Where necessary to prevent danger from falling objects, hoist platforms should be provided with adequate covering.

xvii) Counterweights consisting of an assemblage of several parts should be made of specially constructed parts rigidly connected together.

xviii) Counterweights should run in guides.

xix) Platforms should be provided at all landings used by workers.

xx) Following notices should be posted up conspicuously and in very legible characters:

(a) on all hoists:

- on the platform: the carrying capacity in kilograms or other appropriate standard unit of weight;
- on the hoisting engine: the lifting capacity in kilograms or other appropriate standard unit of weight;

(b) on hoists authorised or certified for the conveyance of persons:

- on the platform or cage: the maximum number of persons to be carried at one time;

(c) *on* hoists for goods only:

- on every approach to the hoist and on the platform: prohibition of use by persons.

xxi) Hoists intended for the carriage of persons should be provided with a cage so constructed as to prevent any person from falling out or being trapped between the cage and any fixed part of the structure when the cage gate is shut, or from being struck by the counterbalance weight or by articles or materials tailing down the hoist way.

xxii) On each side in which access is provided, the cage should have a gate fitted with devices which ensure that the gate cannot be opened except when the cage is at a landing and that the gate must be closed before the cage can move away from the landing.

xxiii) Every gate in the enclosure of the hoist shaft which gives access from a landing place to the cage should be fitted with devices to ensure that the gate cannot be opened except when the cage is at that landing place, and that the cage cannot be moved away from that landing place until the gate is closed.

6.8.3 Derricks

Stiff-leg derricks

i) Derricks should be erected on a firm base capable of taking the combined weight of the crane structure and maximum rated load.

ii) Devices should be used to prevent masts from lifting out of their seating.

iii) Electrically operated derricks should be effectively earthed from the sole plate or framework.

iv) Counterweights should be so arranged that they do not subject the backstays, sleepers or pivots to excessive strain.

v) When derricks are mounted on wheels:

a) a rigid member should be used to maintain the correct distance between the wheels;
b) they should be equipped with struts to prevent them from dropping if a wheel breaks or the derrick is derailed.

vi) The length of a derrick jib should not be altered without consulting the manufacturer.

Guy derricks

i) The restraint of the guy ropes should be ensured by fitting stirrups or anchor plates in concrete foundations.

ii) The mast of guy derricks should be supported by six top guys spaced approximately equally.

iii) The spread of the guys of a guy derrick crane from the mast should not be more than 45^0 from the horizontal.

iv) Guy ropes of derricks should be equipped with a stretching screw or turnbuckle or other device to regulate the tension.

v) Gudgeon pins, sheave pins and fool bearings should be lubricated frequently.

vi) When a derrick is not in use, the boom should be anchored to prevent it from swinging.

6.8.4 Lifting ropes

i) Only ropes with a known safe working capacity should be used as lifting ropes.

ii) Lifting ropes should be installed, maintained and inspected in accordance with manufacturers' instructions.

iii) Repaired steel ropes should not be used on hoists.

iv) Where multiple independent ropes are used, for the purpose of stability, to lift a work platform, each rope should be capable of carrying the load independently.

6.9 VEHICLE MOVEMENT

6.9.1 Park vehicles only at designated places. Don't block roads to create hindrance for other vehicles.

6.9.2 Don't overload the vehicle.

6.9.3 Obey speed limits and traffic rules.

6.9.4 Always expect the unexpected and be a defensive driver.

6.9.5 Drive carefully during adverse weather and road conditions.

6.9.6 Read the road ahead and ride to the left.

6.9.7 Be extra cautious at nights. Keep wind screens clean and lights in working condition.

6.9.8 All vehicles used for carrying workers and construction materials must undergo predictive/preventive maintenance and daily checks

6.9.9 Driver with proper valid driving license shall only be allowed to drive the vehicle

6.9.10 Routes shall be leveled, marked and planned in such a way so as to avoid potential hazards such as overhead power lines and sloping ground etc.

6.9.11 While reversing the vehicles, help of another worker should be ensured at all times

6.9.12 An unattended vehicle should have the engine switched off

6.9.13 Wherever possible one-way system shall be followed

6.9.14 Barriers/fixed stops should be provided for excavation/openings to prevent fall of vehicle

6.9.15 Load should be properly secured

6.9.16 The body of the tipper lorry should always be lowered before driving the vehicle off.

6.9.17 Signs/signals/caution boards etc. should be provided on routes .

6.10.2. Demolition of structural steelwork

i) All precautions should be taken to prevent danger from any sudden twist, spring or collapse of steelwork, ironwork or reinforced concrete when it is cut or released.

ii) Steel construction should be demolished tier by tier.

iii) Structural steel parts should be lowered and not dropped from a height.

7.0 FIRST AID

First aid facilities should be provided in line with various statutory regulations like factory act etc. However following care should be taken:

i) First aid, including the provision of trained personnel should be ensured at work sites. Arrangement should be made for ensuring the medical attention of the injured workers. First aid box should be as per the Factory rules.

ii) Suitable rescue equipment, like stretchers should be kept readily available at the construction site.

iii) First-aid kits or boxes, as appropriate and as per statutory requirements, should be provided at workplaces and be protected against contamination by dust, moisture etc.

iv) First-aid kit or boxes should not keep anything besides material for first aid in emergencies.

v) First-aid kits and boxes should contain simple and clear instructions to be followed, be kept under the charge of a responsible person qualified to render the first aid and be regularly inspected and stocked.

vi) Emergency telephone numbers of nearby Hospitals, Police, Fire Station and Administration should be prominently displayed.

8.0 DOCUMENTATION

The intention of keeping documentation of all types of accident(s) is to prevent recurrence of similar accident(s). All accidents should be reported as per Guidelines and Factories Act, 1948.

All accidents (major, minor or near miss) should be investigated, analyzed and recommendations should be documented along with implementation status.

All related data should be well-documented and further analysis highlighting the major cause(s) of accidents be done. This will help in identifying thrust areas and training needs for prevention of accidents.

9.0 SAFETY AWARENESS & TRAINING

Safety awareness to all section of personnel ranging from site-in-charge to workmen helps not only preventing the risk but also build up the confidence. Time and expenditures also get saved as a result.

Safety awareness basically seeks to persuade/inform people on safety besides supplementing skill also. Awareness programme may include followings:

i) **Poster:** Posters with safety slogan in humorous, gruesome demonstrating manner may be used to discourage bad habits attributable to accidents by appealing to the workers' pride, self-love, affection curiosity or human aspects. These should be displayed in prominent location(s).

ii)

iii) **Safety Sign Boards**: Different type of message of cautioning, attention, notice etc. should be displayed at the appropriate places for learning/ awareness of the workmen while working at site.

iv) **Films & Slides:** Film(s) narrating the accident including the causes and possible remedial ways of preventing the recurrence of a similar accident should be displayed at regular intervals. Slides consisting main points of the film show may also be shown to workers.

v) **Talks, lectures & conferences:** The success of these events would depend much on audience's understandings of the speaker (s). The speakers are to be knowledgeable and good presenter. Speakers should know to hold the attention and to influence the audiences.

vi) **Compotitions:** Organize competition(s) between the different depts.,/categories of workers. The sense of reward/recognition alsowill improve safety awareness and result in enhancing safety levels.

vii) **Exhibitions:** Exhibitions also make the workers acquainted with hazards and means of preventive measures.

viii) **Safety Publication:** Safety publications including pocket books dealing with ways of investigation and prevention in the field of safety and so on, may be distributed to workers to promote the safety awareness.

ix) **Safety Drives:** From time to time, an intensive safety drive by organizing a safety day or a safety week etc. should be launched.

x) **Training:** Training for covering the hazards for different trade should be imparted. Training should also include the specific hazards related to a job in addition to the general safety training as has been dealt in various chapters and should include all workers.

10.0 LIST OF SAFETY CODES FOR CIVIL WORKS PUBLISHED BY BUREAU OF INDIAN STANDARDS

Sl.No.	Code No.	Title
01	IS : 818	Code of Practice for Safety and Health Requirements in Electric and Gas Welding and Cutting Operations – First Revision.
02	IS : 875	Code of practice for Structural safety of buildings: Masonry walls
03	IS : 933	Specification for Portable Chemical Fire Extinguisher, Foam Type – Second Revision.
04	IS :1179	Specification for Equipment for Eye and Face Protection during Welding – First Revision.
05	IS : 1904	Code of practice for Structural safety of buildings: Shallow foundations
06	IS : 1905	Code of practice for Structural safety of buildings: Masonry walls
07	IS : 2171	Specification for Portable Fire Extinguishers, Dry Powder Type – Second Revision.
08	IS : 2361	Specification for Building Grips – First Revision.
09	IS : 2750	Specification for Steel Scaffoldings.
10	IS : 2925	Specification for Industrial Safety Helmets – First Revision
11	IS : 3016	Code of Practice for Fires Precautions in Welding and Cutting Operations – First Revision
12	IS : 3521	Industrial safety belts and harnesses
13	IS : 3696	Safety Code for Scaffolds and Ladders : Part I – Scaffolds.
14	IS : 3696	Safety Code for Scaffolds and Ladders : Part II – Ladders.
15	IS : 3764	Safety Code for Excavation Work
16	IS : 4014	Part I & II Code of practice for Steel tubular scaffolding
17	IS : 4081	Safety Code for Blasting and Related Drilling Operations.
18	IS : 4082	Recommendations on staking and storage of construction materials at site

Sl.No.	Code No.	Title
19	IS : 4130	Safety Code for Demolition of Buildings – First Revision.
20	IS : 4138	Safety Code Working in Compressed Air-First Revision
21	IS : 4912	Safety requirements for Floor and Wall Openings, Railings and toe Boards –First Revision.
22	IS : 5121	Safety Code for Piling and other Deep Foundations.
23	IS : 5916	Safety Code for Construction involving use of Hot Bituminous Materials.
24	IS : 5983	Specification for Eye Protectors – First Revision.
25	IS : 6922	Structures subject to underground blasts, criteria for safety and design
26	IS : 7205	Safety Code for Erection on Structural Steel Works.
27	IS : 7069	Safety Code for Handling and Storage of Building Materials.
28	IS :7293	Safety Code for Working with Construction Machinery.
29	IS : 7969	Safety code for handling and storage of building material
30	IS : 8758	Recommendation for Fire Precautionary Measures in construction of Temporary Structures and Pandals.
31	IS : 8989	Safety Code for Erection of Concrete Framed Structures
32	IS : 9759	Guidelines for de-watering during construction
33	IS : 11057	Code of practice for Industrial safety nets
34	IS : 13415	Code of Practice on safety for Protective barriers in and around building
35	IS : 13416	Recommendations for preventive measures against hazards at working places

The contractor should engage Technical persons and Workmen with the following qualifications for works as detailed below and the contractor shall carry out the Health Performance check at his cost for the workman engaged in the work through a registered medical practitioner and produce the certificate on demand.

CHECK FOR HEALTH PERFORMANCE

Sl. No.	Activity	Hazard	Exposure Consequence	Check for	Periodicity
1	Concrete Dismantling	Emission of Dust & Noise	1	Lung function	Once in a Year
2	Concrete Mixing	Emission of Dust & Noise	1	Lung function	Once in a Year
3	Painting	Emission of Dust & fumes	1	Lung & throat function	Once in a Year
4	Cutting & Welding	Emission of fumes and gas. Exposure to Live wire	3	Eyes & Lung function	Once in a Year
5	Working on AC sheets	Emission of Dust	3	Lung function	Once in a Year
6	Sweeping of Roads	Emission of Dust	2	Lung function	Once in a Year
7	Collection and disposal of Sanitary waste	Foul smell & susceptibility to decease.	3	Lung function and skin irritation	Once in a Year
8	Handling of Oxygen & Acetylene Cylinders	Leakage of gas	4	Throat irritation	Once in a Year
9	Cleaning of Manholes	Exposure to poisonous gas	4	Suffocation	Once in a Year
10	Cleaning of Overhead tank	Emission of Dust	1	Suffocation & skin irritation	Once in a Year

NOTE: Exposure Consequence

1. Slightly harmful
2. Harmful
3. Very harmful
4. Extremely harmful

BHARAT HEAVY ELECTRICALS LIMITED ,
UNIT: TIRUCHIRAPALLI - 620 014

CIVIL ENGINEERING DEPARTMENT (TOWNSHIP)

NORMS FOR QUALIFICATION

Name of work : Design, fabrication, supply and erection of Pre Engineered steel Building including crane girder, roof & side cladding, accessories, sky light panels, roof / turbo ventilator etc. for Production shop floors of PPPU - BHEL near Thirumayam in Pudukkottai (Dt) (Tamilnadu)

Tender Schedule No. T 25 / 10

Sl. No.	Thrust Area	Score	
	ELIGIBILITY:- **1. Separate Registration for EPF, PAN, Service Tax New Registration No. , proof of having submitted IT return for the last three years, Profit & Loss account and balance sheet certified by the auditor.** **2 Average annual turnover in PEB in the last 3 years shall be Rs. 40 crores** **3. During last three years should have successfully completed at least one Pre Engineered Steel Building work not less than Rs. 40 crores** **4. Latest Solvency (obtained within six months) from Nationalised / Scheduled Bank shall be at least for Rs. 40 crore** **5. Should own Pre Engineered Building component manufacturing facility, design capacity to match the tender requirement and should have supplied PEBs with EOT crane capacity of 50 Tonnes and higher.**		

	THRUST AREA	SCORE	QUALIFICATION NORMS
I	**NATURE OF COMPANY**	**5**	
	Public Limited	5	
	Private Limited/Partnership firm	3	
	Sole Proprietor	2	
II	**Similar Experience (In PEB Construction)**	**20**	
	Total value of similar works executed in the last three years	20	Rs. 24000 lakh
	(Pro-rata for in between cases)	12	Rs.12000 lakh

III	**Performance on previous works**	**10**	
	Successful completion of three major works in time.	10	Costing atleast Rs.4000 lakh each
	Successful completion of two major works in time.	8	Costing atleast Rs.4000 lakh each
	Successful completion of one major work in time.	6	Costing atleast Rs.4000 lakh each
IV	**Completion of single work related to Pre Engineered Building in the last 3 years**	**30**	
	More than	30	Rs. 8000 lakh
	(Pro-rata for in between cases)	24	Rs. 6000 lakh
	(Pro-rata for in between cases)	18	Rs. 4000 lakh
V	**Average Annual Turnover of similar works in last 3 financial years**	**10**	
	More than	10	Rs. 8000 lakh
	(Pro-rata for in between cases)	6	Rs. 4000 lakh
VI	**Equipments owned**	**10**	
	Own prefab unit with design office, Mobile crane, Tower crane, Builders Hoist, Winch, Welding generators, welding transformers, Submerged Arc Welding machines, Drilling machine, Erection tackles & tools, Total station, Measuring instruments with laser technology, Diesel Generator etc	10	
	Own prefab unit with design office, Mobile crane, Builders Hoist, welding transformers, Submerged Arc Welding machines, Drilling machine, Erection tackles & tools, Measuring instruments with laser technology, Diesel Generator etc	6	
VII	**Qualified staff availability**	**5**	
	If adequate Graduate Engineers, Supervisors & Tech. Staff available.	5	
	If adequate Graduate Engineers & Supervisors available.	4	
	If adequate Graduate Engineers & Tech. Staff only available.	3	
	If adequate Supervisors & Tech. Staff only available.	2	
VIII	**Financial stability**	**10**	
	Solvency	10	Rs. 8000 lakh
	(Pro-rata for in between cases)	6	Rs. 4000 lakh

NOTE: 1. Minimum score required for qualification is 60 out of 100.

BHARAT HEAVY ELECTRICALS LIMITED
TIRUCHIRAPPALLI - 620 014

CIVIL ENGINEERING DEPARTMENT (TOWNSHIP)

QUALIFICATION PROFORMA

1. Name of applicant : Shri / M/s

2. Nationality : Indian ☐ ☐

3. Address : ……..
……..
……..
……..

4. Telephone No. : ☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐

Fax No. : ☐☐☐☐☐☐☐☐☐ E-mail :

5. Constitution

Individual	☐	Sole Proprietorship concern	☐
Partnership Firm	☐	Private Ltd. Company	☐
Public Ltd. Company	☐		

6. In case of Limited Liability Company or Company Limited by Guarantees. :
A) amount of paid-up-capital

7. Enclose a chart showing Company Organisation indicating various factories / workshops / sites / divisions etc., with levels and names of key personnel and clearly depicting the reporting and functional relationships. Also give brief write-up on the functions and responsibilities of each entity.

-8. Details of Owner / Partners / Directors (Strike out whichever is not applicable)

Sl. No.	Name & Designation	Occupation Address	Telephone No.	Fax No.	E-mail
	To be furnished in separate sheet -				

9. Value of property owned, Certificate to be produced from the Revenue Department.

10. Does the applicant maintain any office for preparing designs, drawings, bills, etc.

11. Does the applicant posses facility to set up laboratory for Quality Control at site of work. If so please furnish full details of organisation, equipments, tools, etc.

12. Is the individual/sole proprietor/any partner/ directors of company:

(a) Dismissed Government Servant — Yes ☐ No ☐

(b) Having business banned/suspended by any government in the past — Yes ☐ No ☐

(c) Convicted by a court of law — Yes ☐ No ☐

(d) Retired Engineer / Official from Engineering Departments of Govt. of India within last two years — Yes ☐ No ☐

(e) Director or partner of any other company / firm enlisted with CPWD or any other department — Yes ☐ No ☐

(f) Member of Parliament or any State Legislative Assembly — Yes ☐ No ☐

If answer to any of the above is 'Yes", furnish details on a separate sheet

13. Name of person holding power of attorney. (Copy to be enclosed) ……

(a) Nationality — Indian ☐ Other ☐

(b) Liabilities

14. Name of Banker with full address (**Note**: Banker's report in original preferably in sealed cover, giving the financial capacity to handle works of the required magnitude should be enclosed) ……

15. Place of business ……

16. Date of commencement of business

17. Details of Income Tax paid during last three years.
1. 2009-10
2. 2008-09
3 2007-08

18. State whether Income Tax Clearance Certificate from the appropriate authority in the prescribed form enclosed. — Yes ☐ No ☐

19. Contractor's capital in the business. (in case of partnership, please mention percentage of shares and amount)

20. Quantum of business done during last three financial years
1. 2009-10
2. 2008-09
3 2007-08

21. Value of fixed assets of the business in the last three years
1. 2009-10
2. 2008-09
3 2007-08

22. Guarantee limits (if any) enjoyed by the firm.

23. Over-draft limits (if any) enjoyed by the firm.

24. State whether Audited report for Profit and Loss Account & Balance Sheet for last three years enclosed. — Yes ☐ No ☐

25. Details of Technically qualified staff :-

Sl. No.	Name and Designation	Qualification	Experience and Specialisation	Remarks if any

26. Whether the details of T & P, Machinery, Equipments and work shop as per Annexure – I given. Yes ☐ No ☐

27. Whether enlisted with any other Department Yes ☐ No ☐

(a) If yes, give details:

(i) Name of Department & address ……..……..…….

(ii) Money limit ……..……

(iii) Enlistment No. & date ……

(iv) Valid upto

28. Licence No. and validity of licence obtained from Dy. Chief Inspector of Factories / Assistant Commissioner of Labour

29. Whether the applicant has registered his workmen under Employees' State Insurance Act. If so, code number may be furnished. If applied, attested copy of application for registration acknowledged by ESI Authorities.

30. Whether the applicant has registered his workmen under Employees' Provident Funds and Miscellaneous Provisions Act ?. If so, the code number may be furnished. If applied, attested copy of application for registration with acknowledged by PF Authorities.

31. Indicate Central / Local Sales Tax, Excise Duty code Numbers and PAN.

1. CST
2. LST
3. ED
4. PAN

32. Is any person working with the applicant as a near relative of the Officer / Official of BHEL Yes ☐ No ☐

(a) If yes, give details

(i) Name ……

(ii) Staff No. ……

(iii) Designation & Department ……

(iv) Unit ……

33. Details of similar works completed during the last seven years (To be submitted in separate sheet as per Annexure-II.)

34. Certificates from clients in original as per proforma given in Annexure -III for all eligible works.

35. Certificates:

(i) I/We (including all partners) certify that I/We have read the Preamble & Terms and conditions and shall abide by them.

(ii) I/We certify that the information given above is true to the best of our knowledge. I/We also understand that if any of the information is found wrong, I/We am/are liable to be debarred.

(iii) I/We certify that I/We will not get myself / ourselves registered as contractor(s) in BHEL under more than one name.

(iv) (a) I certify that I did not retire as an Engineer of Gazetted rank or as any Gazetted Officer employed on Engineering or Administrative duties in any Engineering Department of the Government of India during the last two years. I also certify that I have neither such a person under my employment nor shall I employ any such person within two years of his retirement except with the prior permission of the Government. (For Individuals seeking enlistment in their own name).

(b) We certify that none of the partners/directors retire as an Engineer of Gazetted rank or as any Gazetted Officer employed on Engineering or Administrative duties in last two years. We also certify that we have neither under our employment any such person nor shall we employ any person within two years of his retirement except with the prior permission of the Government. (For partnership firms and limited companies).

Signature(s) of the applicant(s)

	Name	Signature	Address (Seal in case of Firm)
1.	……...	……	……
2.	……...	……	……
3.	……...	……	……
4.	……...	……	……
5.	……...	……	……

Date:

NOTE: 1) All the relevant certificates, details etc. should be attached with the application.
2) The terms that are not applicable may be scored out.

Details of documents attached:-

1.
2.
3.
4.
5.
6.
7.
8.
9.
10.

ANNEXURE – I

DETAILS OF PLANTS AND EQUIPMENTS OWNED

Sl. No.	Name of Equipments	Nos.	Capacity or Type	Age	Remarks
	Earth moving equipments				
1.	Excavator (Various sizes)				
	Equipments for hoisting & lifting				
1	Mobile crane				
2.	Tower crane				
3.	Builder's hoist				
	Equipments for concrete works				
1.	Concrete batching plant				
2.	Concrete pump				
3.	Concrete transit mixer				
4.	Concrete mixer (diesel)				
5.	Concrete mixer (electrical)				
6.	Concrete vibrator (electrical)				
7.	Concrete vibrator (petrol)				
8.	Table vibrator (elect./petrol)				
	Equipments for building works				
1.	Block making machine				
2.	Bar bending machine				
3.	Bar cutting machine				
4.	Wood thickness planer				
5.	Drilling machine				
6.	Circular saw machine				
7.	Welding generators				
8.	Welding transformers				
9.	Cube testing machine				
10.	Steel shuttering				
11.	Steel scaffolding				
12.	Grinding/polishing machine				
	Equipments for road works				
1.	Road roller				
2.	Bitumen paver finisher				
3.	Hot mix plant				
4.	Spreaders				
5.	Earth rammers				
6.	Vibratory road roller				
	Equipments for transportation				
1.	Tipper				
2.	Truck				
	Pneumatic equipments				
1.	Air compressor (diesel)				
	Dewatering equipments				
1.	Pump (diesel)				
2.	Pump (electrical)				
	Power equipments				
1.	Diesel generator				
	Any other plants/equipments				

ANNEXURE - II

DETAILS OF SIMILAR WORKS COMPLETED DURING THE LAST SEVEN YEARS (2003 – 2004 TO 2009-2010)									
Sl. No.	Name of work & Agreement No.	Date of commence ment	Date of completion		Reasons for delay & compensation levied, if any	Work order Value	Gross cost of completion		Name, designation & complete address of the authority for whom the work was done
			Stipulated	Actual			Including cost of cement, steel reinforcement & strl. steel	Excluding cost of cement, steel reinforcement & strl. steel	
DETAILS OF WORK COMPLETION CERTIFICATES, WORK ORDERS ETC. ARE TO BE FURNISHED									

CONTRACTOR 138 **ACCEPTING OFFICER**

ANNEXURE - III

CLIENT'S CERTIFICATE REGARDING PERFORMANCE OF CONTRACTORS

Name & Address of the Client

…… …….

…….

Details of works executed by Shri . M/s ……

……

1.	Name of work with brief particulars	:	
2.	Agreement No. and date	:	
3.	Date of commencement	:	
4.	Stipulated date of completion	:	
5.	Actual date of completion	:	
6.	Details of compensation levied for delay, if any:		
7.	Tendered amount	:	
8.	Gross amount of the work completed	:	
9.	Name and address of the authority under whom work executed	:	
10.	Whether the contractor employed qualified Engineer/Overseer during execution of work?	:	
11.	(i) Quality of work (indicate grading)	:	Outstanding/V.Good/Good/Poor
	(ii) Amount of work paid on reduced rate basis, if any	:	
12.	(i) Did the contractor go for arbitration ?	:	
	(ii) If yes, amount of claim	:	
	(iii) Amount received	:	
13.	Comments on the capabilities of the contractor		
	(a) Technical Proficiency	:	Outstanding/V.Good/Good/Poor
	(b) Financial Soundness	:	Outstanding/V.Good/Good/Poor
	(c) Mobilisation of adequate T & P	:	Outstanding/V.Good/Good/Poor
	(d) Mobilisation of manpower	:	Outstanding/V.Good/Good/Poor
	(e) General behaviour	:	Outstanding/V.Good/Good/Poor

NOTE: All columns should be filled in properly.

Signature of the Certifying Officer
with Official seal.

CONTRACTOR **ACCEPTING OFFICER**