(Estimated Cost: Rs.41,53,600/- including GST)

- **It is to be mentioned that under MSE, only manufacturer's quoting his own make are exempted from submission of EMD, else bid shall be rejected. Traders/Dealers are requiredto submit the EMD.**

- **It is clarified that Udyog Aadhaar Memorandum (UAM) is not valid w.e.f. 01.07.2022. Hence,the bidder seeking exemption in EMD shall submit valid UDYAM Registration Certificate or any other valid exemption certificate only.**

- **For any clarifications please Email on:pnc-chamera1@nhpc.nic.in**

For & On behalf of NHPC Ltd.

Dy. General Manager,
Procurement & Contract,
Chamera Power Station-I,
Khairi, Distt-Chamba (HP)-176325
Phone no 01899-263022, Mob. No. 7042864422.
इमेल/Email: pnc-chamera1@nhpc.nic.in

ADDITIONAL TERMS & CONDITIONS (ATC)

ADDITIONAL TERMS & CONDITIONS (ATC)

I. Qualification Requirement: -

Qualification requirements for **"Supply & installation of "11KV Vacuum Circuit Breaker" alongwith panel & accessories in Switchyard of Chamera Power Station-I."** shall be as under:

(A) **The bidders must fulfil the following minimum Qualifying Criteria: -**

i) The Bidder should be manufacturerof **Vacuum Circuit Breaker (VCB).**

Or

Authorized dealer of amanufacturer **for Vacuum Circuit Breaker (VCB)** to quote on behalf of their manufacturer, in case manufacturer does not quote directly. In such a case, the authorized dealer shall have to submit relevant **"Authorized Dealership"** certificate from the manufacturer.

Only agencies submitting a general Dealership or Authorization certificate issued by the manufacturer, without reference to any specific tender and having validity of such authorization for the considerable duration shall only be considered for determining the eligibility of the Bidder for the particular tender. Authorization issued with reference to the specific tender in favour of particular dealer/bidder will not be entertained.

ii) In case a dealer is participating in a tender on behalf of one manufacturer, he is not allowed to participate/ quote on behalf of another manufacturer in this tender or in a parallel tender for the same item. All such bids with same make/ manufacturer will be rejected.

iii) A valid ISO certification of manufacturer for manufacturing the specified goods should be submitted with the bid.

iv) The bidder should have supplied at least two similar equipment / system of the same capacity or higher in previous seven years.

The definition of the similar equipment / system shall be "Supply of 11KV Vacuum Circuit Breaker or higher voltage rating".

v) The equipment supplied should have performed satisfactory for one year from the date of commissioning and performance certificate issued by purchaser is required.

vi) **FINANCIAL CRITERIA:**

a) Turnover: The Average Annual Financial Turnover of the bidder during the last 3 years, ending 31st March should be at least 50% of the estimated cost (or equivalent in foreign currency at exchange rate prevalent on 31st March) as per the Annual Report (Audited Balance Sheet and Profit & Loss Account) of the relevant period, duly authenticated by a Chartered Accountant/ Cost Accountant in India or equivalent in relevant countries.

b) Working Capital: The working Capital (current assets minus current liabilities) shall be equal to at least 3 times the monthly cash flow requirement i.e. Estimated cost of work*3/supply period.....INR.

c) Net Worth: The net worth of the bidder firm (Manufacturer or Principal of authorized representative (i) should not be negative on 31st March of the previous financial year and also (ii) if it is less than paid up equity share capital then it should not have been eroded by more than 30% (Thirty percent) in the last three years ending 31st March of the previous financial year.

d) The bidder against whom proceedings for insolvency under the Insolvency and Bankruptcy Code 2016 (as amended time to time) have been started shall not be eligible for bidding.

(B) Documents to be Submitted by the bidder in support of meeting Financial Criteria:

i) The bidders should submit authenticated copies of supply orders for the type/model/make of offered equipment issued by various clients and alongwith corresponding supply of material Certificate/Invoice/Inspection report and performance report from the purchaser/client as .

ii) The bidder shall submit the copy of Annual Report/Standalone audited Annual Financial Statement containing Balance Sheet, Profit & Loss Statement, cash flow statement, Auditor's Report thereon including all relevant schedules/annexures etc. of last three years.

iii) In case where Audited financial results for the immediately preceding year are not available, then a statement of account as on closing date of the immediately preceding year depicting the Turnover, Net Worth (Calculated as per laid down criteria) duly certified by their Statutory Auditor/Certified Public Accountant carrying out the statutory audit shall be enclosed with the Application along with the copy of appointment letter of the statutory auditor.

iv) Wherever, the Annual Report/ duly notarized copies of Audited Printed Annual Financial Statement are in language other than English, then copy duly translated & printed into English Language and certified by approved/recognized English translator shall be submitted with the application.

v) For conversion to US$ the exchange rate at the end of the respective accounting year shall be considered.

vi) The reference date for considering the period of eligibility / qualification requirement above shall be the last day of the month previous to the one in which tenders are invited.

The Vacuum Circuit Breaker being procured is a critical part of the system for Power House/Switch yard operation therefore, the exemption of prior experience only for MSEs and Start-up will not be considered.

II. TERMS AND CONDITIONS OF CONTRACT (T&C)

1.0 Scope of Supply/Contract:

Procurement of ***Supply & installation of "11KV Vacuum Circuit Breaker" alongwith panel & accessories in Switchyard of Chamera Power Station-I****as per Schedule of Quantity / BoQ, Technical specifications, Drawings & Scope of Work.*

2.0 Prices and Taxes &Duties:

2.1 Prices shall be Firm and on F.O.Rdestination basis i.e. Central Store, Chamera Power Station-I, Khairi, Distt-Chamba (HP)inclusive of charges for packing, handling, forwardingand transportationand all applicable taxes &duties *including those assessed on the Employer*.

Further, the contract unit rates shall also be after considering the Input Tax credit and other benefits.

2.2 Taxes, duties and levies, as applicable twentyeight (28) days prior to deadline for submission of bids *(including on Transportation*), shall be mentioned in Price Bid i.e.SoQ.**(Section-II)**

2.3 All taxes & duties mentioned in the Price Bid as per clause 2.2 above shall be paid / reimbursed against proper invoice as per rules and other relevant documents, if anyand restricted to the total amount of Taxes &Duties in Price Bid subject to clause 2.4 below. No other taxes and duties shall be payable / reimbursable by NHPC.

TDS wherever statutory required under any Tax Act/Rule shall be deducted and deposited and necessary certificate will be provided by the Employer.

2.4 Statutory variation, in Taxes and Duties or levy of any new Tax after 28 (Twenty Eight) days prior to deadline for submission of bid will be adjusted / reimbursed against production of documentary evidencesubject to timely delivery as per terms & condition of contract.

2.5 Invoices and other documents submitted by contractor/supplier for payment under interim Payment Certificate/Final Payment Certificate or any other payment under the contract shall be in accordance with the GST Law.

The contractor shall furnish a certificate along with interim Payment Certificate/Final payment certificate that GST payable by him has been deposited/will be deposited to the Govt. Treasury.

2.6 The GSTIN along with relevant details for Chamera Power Station-I has been indicated below for your ready reference.

Name of Project / Unit	:	NHPC LIMITED, Chamera Power Station-I
Address of Principal place of business/ Additional place of business	:	PO-KHAIRI, TEHSIL-DALHOUSIE
State	:	Himachal Pradesh
State Code	:	02
GSTIN	:	02AAACN0149C1ZB
Principal place of business for the purpose of GST	:	Khairi, Distt-Chamba (HP)-176325.

2.7 Transit Insurance shall be borne **Transit Insurance:** As per SCC.

2.8 Other than normal payment through NEFT/RTGS directly from NHPC Ltd, the MSME Vendors has an option to avail the TReDS facility. NHPC has registered itself on TReDS platform with M/s A. TREDS Limited, CIN-U74999MH2016PLC281452, Registration no.(Account no): 1000005783, Communication address: A. TREDS Ltd., Ashar IT Park,11th Floor, Road No.16Z, Wagle, Industrial Estate, Thane (West)-400604. The TReDS facilitates financing of invoices of MSMEs by way of discounting by financiers. MSMEs can upload the invoices in the system and NHPC Ltd. can accept the invoices in the system. Upon NHPC's acceptance, the Banks/NBFCs can discount the invoices and can release the payment directly to the MSMEs. In this regard; MSME vendors can refer to RBI guidelines available on website of RBI.

3.0 Terms of Payment:

As per SCC…….

In case of MSE:

All the payments for the supplies and/ or services *[as applicable]* rendered by MSEs (Micro & Small Enterprises) Supplier/ Contractor under the Contract shall be released within forty five (45) days from the day of acceptance*.

In case, payment are not released as mentioned above, NHPC shall pay the principal amount plus compound interest with monthly rests from the date of immediately following the date agreed upon @ three times of bank rates as notified by Reserve Bank of India from time to time.

* **Day of Acceptance means** - day of the actual delivery of goods or the rendering of services; where any objection is made in writing by the buyer regarding acceptance of goods or services within fifteen (15) days from the date of delivery of the goods or the rendering of services, the day on which such objection is removed by the Supplier.

In case of non-MSE:

All the payments for the supplies and/or services [as applicable] rendered by non-MSEs (non-Micro & Small Enterprises) Supplier/ Contractor under the Contract shall be released within forty five (45) days from the receipt of invoice/ bills from the Contractor/ Supplier complete in all respect.

In case, payment are not released as mentioned above, NHPC shall pay the principal amount plus simple interest from the date immediately following the date agreed upon @ 8% (eight percent) per annum.

4.0 Delivery Period:

The delivery of equipments/items (Supply & installation) shall be completed within 90 days as per detailed mentioned on SCC.

5.0 Liquidated Damages:

If the Supplier fails to attain completion of the supply of the material or any part thereof within the prescribed time for completion under clause 5.0 or any extension thereof (due to delays not attributable to the Supplier), the Supplier shall pay to the Purchaser liquidated damages equal to the amount computed @½ (half) percent per week or part thereof of Contract Price. The aggregate amount of such Liquidated damages shall in no case exceed 10% of the Contract Price. However, cost compensation for any time extension shall not be paid.

6.0 Performance Guarantee:

Performance security should be deposit within 28 days of receipt of Order, the Supplier shall furnish to the Engineer-in-Charge/Consignee a performance security in the form of Demand Draft/ Bank Guarantee from an Indian Nationalized Bank or any Scheduled Bank in India as

per the format appended as **Annexure-B** of ATC Document herewith for an amount equal to **Five percent (5%)** of the originally awarded contract price by way of guarantee valid till **90 Days** beyond the defect liability period for the due and faithful performance of the delivery along with the other terms and conditions agreed to. Performance security shall not be released till Liquidated damage, if any, is pending for recovery.

If the supplier does not submit the performance security within the stipulated period due to any valid reason. Tender inviting Authority may grant time extension for submission of performance security based on the request of supplier. In case, the supplier does not submit performance security without a valid reason, the Employer shall impose simple interest @12% per annum on the full amount of applicable performance security (along with applicable taxes, if any) for the period of delay in submission of performance security. The interest on delayed period shall be calculated on pro rata basis for number of delayed days. The interest accrued shall be payable by the supplier within 14 days from the date of intimation by tender inviting authority in from of bank demand draft /Banker Cheque in favour of 'NHPC Limited', otherwise the same shall be recovered from any payment due or become due against bills/ any other amount lying with NHPC.

The delayed submission of Performance Security by the supplier shall be recorded in substantial completion and final completion certificates. Further, no claim for extension of time for delivery period or any other type of claim on account of delayed submission of performance security shall be entertained. If supplier fails to submit the performance security within 45 days (for the supply having time for delivery – up to 12 months) or 60 days (for the supply having time for delivery – more than 12 months) from the date of issue of Letter of Award (LOA), then following actions shall be taken against such supplier:

I. Award shall summarily be terminated.
II. EMD /Bid security shall be forfeited.
III. The bidder shall be debarred / banned to participate in the business dealings with NHPC for a period of one year.
IV. The name of the supplier shall be hosted on the NHPC website etc. as per existing norms of NHPC /Govt. of India.
V. Such defaulted supplier shall not be eligible to participate in the bidding process of re tender of this supply.

The supplier shall at his own cost get the validity period of bank guarantee furnished by him extended from time to time till 90 days beyond the defect liability period as per the provisions of the contract. He shall furnish the extended/revised Bank Guarantee to the Engineer-in-charge one month before the expiry date of the original bank guarantee or any extension thereof. In case the extended/revised Bank Guarantee is not received by the Engineer-in-charge/Consignee within the specified period of one month, the Employer entirely at his discretion shall be at liberty to encash the aforesaid bank guarantee.

The Performance Security / Security deposit shall be released after successful delivery of the entire supply, including extension, if any. However, the performance security shall not be released till compensation, if any, is pending for recovery.

The Performance Security/Security deposit amount will not earn any interest for the whatsoever period detained by NHPC. Bidders shall communicate the following bank details to the issuing Bank for online confirmation of Bank Guarantee to be submitted in terms of this clause:

Name of the beneficiary: **NHPC Limited**
Account No. : **11538537066**
IFSC Code: **SBIN0008844**

Address of the Bank: **State Bank of India, Khairi, Chamba (HP)**

7.0 Guarantee / Warrantee:

The equipment/ items/system shall be warranted against poor quality or workmanship of material or manufacturing defects for a minimum period of 12 months commencing upon the setting to work of item/ plant or 18 months from the date of despatch whichever is earlier. During the Warrantee period the Supplier shall repair/replace the defected items free of cost and no conveyance or any other charges shall be paid. If any defect is not remedied within a reasonable time, the Purchaser may proceed to do the work at the Supplier's risk and expense, but without prejudice to other rights, which the Purchaser may have against the Supplier in respect of such defects.

8.0 AGREEMENT:

After issue of the Letter of Intent / Award, the Purchaser shall prepare the Agreement on the stamp paper on the Form enclosed as **Annexure-C** and the parties shall sign the said Agreement within 30 Days from the date of issue of Letter of Intent / Award. The expenses of completing and stamping the agreement shall be borne by the Contractor. The Contractor shall furnish 3 sets of such Contract Agreements to the Purchaser. After the Agreement, one original set shall be handed over to the Contractor and the remaining two sets shall be retained by the Purchaser.

After the bid has been accepted by the Purchaser, all orders or instructions to the Contractor shall, except as herein otherwise provided, be given by the Engineer-inCharge or his authorized representative, in writing, on behalf of the Purchaser.

9.0 NHPC reserves the right to reject any or all tenders and shall not be bound to assign any reason for such rejection.

10.0 Bidder shall submit along with the bids, the requisite Bid Security / EMD for an amount of **Rs.83,000/-(Rupees Eighty Three Thousand Only)** as given in Bid Document. Bid security / EMD may be deposited in the form of a Bank Guarantee (as per **Annexure-A** of this ATC document) /Crossed Bank Draft/Banker's cheque in favour of **NHPC Limited, payable at SBI Khairi (IFSC Code: SBIN0008844)**. Hard copy of the Bank Guarantee (as per GeM terms & conditions)/Crossed Bank Draft/Banker's cheque will have to be submitted directly to the buyer at following address within 5 days of bid opening.Failure to do so may prevent a tender from being considered.

Dy. General Manager,
Procurement & Contract,
Chamera Power Station-I,
Khairi Distt Chamba (HP)-176325
Phone no 01899-263022, Mob. No. 7042864422.

Bid security / EMD may also be deposited online as per the detail given below and documentary evidence of same shall be uploaded in the online bid.

Name of the beneficiary: **NHPCLIMITED**
Account No.: **11538537066**
IFSC Code: **SBIN0008844**
Address of the Bank: **SBI, Khairi**

The bidder seeking EMD exemption, must submit the valid supporting document for the relevant category as per GeM GTC along with the bid. Under MSE category, only manufacturers for goods ~~and Service Providers for Services~~ are eligible for exemption from EMD.

11. All Startups (whether MSEs or otherwise), falling within the definition as per Gazette notification- G.S.R. 501(E) dt. 23.05.2017 are exempted from meeting the qualification criteria in respect of Prior ~~Experience~~ Prior Turnover subject to their meeting the quality and technical specification. However, the Purchaser reserves the right to deny such exemptions to Startups (whether MSEs or otherwise) in case of circumstances like procurement of items related to public safety, health, critical security operations and equipments etc.

11.0 All Micro and Small Enterprises (MSEs) are exempted from meeting the qualification criteria in respect of ~~Prior Experience~~ Prior Turnover in public procurement subject to meeting of quality and technical specifications for which necessary documents shall be submitted by such bidders.

12.0 Inspection:

Inspection shall be carried out by Authorized representative of Purchaser at Central Store, Chamera Power Station-I, Khairi, Distt-Chamba (HP).

13.0 General:

The Purchaser reserves to itself the right to take over the part or full contract from the Supplier after the award of the Contractor during the execution of Contract without assigning any reason.

14.0 Engineer-In-Charge:

Dy. General Manager (E), Power House, NHPC Limited, Chamera Power Station-I, Khairi shall be Engineer-In-Charge of the aforesaid contract. E-mail: phem-chamera1@nhpc.nic.inPh# 9816502126

15.0 Consignee:

Sr. Manager (Stores), NHPC Limited, Chamera Power Station-I, Khairi, Distt- Chamba (HP). E-mail: store-chamera1@nhpc.nic.in. Ph# 9816503278

16.0 Paying Authority:

Group Sr. Manager (Finance) / Head of Finance, NHPC Limited, Chamera Power Station-I, Khairi, Distt- Chamba (HP). E-mail: finance-chamera1@nhpc.nic.in Ph# 9818591968

17.0 Court of Competent Jurisdiction

Any action taken or proceedings initiated on any of the terms of this Agreement shall be only in the court of competent jurisdiction under the District Court, Chamba/ HP High court, Shimla.

18.0 Technical Specifications:

As per attached schedules of Scope of Work & detailed Technical Specifications, GTP & Drawings etc.

19.0 INTEGRITY PACT:

To improve transparency and fairness in tendering process and/or during execution of work undertaken, the Purchaser is to implement a transparency pact.

The Pre-contract Integrity Pact, signed by all the prospective Bidders and the Purchaser shall commit the persons/ officials of both the parties, not to exercise any corrupt/ fraudulent/ collusive/coercive practices in the tendering process and also during implementation of the contract. Only those Bidders who have entered into Integrity Pact with the Purchaser shall be eligible to participate in the bidding process. Entering into Integrity Pact as per Performa provided below is a basic qualifying requirement.

Pre-contract Integrity Pact, is to be executed on plain paper with NHPC Ltd. at the time of submission of Bids. The successful bidder (Contractor) shall submit duly executed Integrity Pact on Non-Judicial Stamp Paper of appropriate value prior to issue of Supply Order.

To oversee the compliance under the Integrity pact, Dr Vinod Agrawal& Shri. Prabhash Singh has been appointed as an Independent External Monitor (IEM) by the Purchaser. The Contact Address of IEM is as under:

Dr Vinod Agrawal
B-103, Sarvodaya Enclave,
2nd Floor, New Delhi-110017.
Email: iem.nhpc@gmail.com

Shri. Prabhash Singh
E7M702, Housing Board Colony,
Area Colony, Bhopal,
Madhya Pradesh-462016.
Email: iem.nhpc@gmail.com

ANNEXURE-A

BANK Guarantee Format for Earnest Money

(To be executed on Non-Judicial Stamp Paper of Appropriate value)

Date:_____

(Name of Contract)

To:

NHPC Limited
NHPC Office Complex
Sector-33, Faridabad (Haryana) -121003 (India)

WHEREAS (name of bidder) (hereinafter called "the Bidder") has submitted its Bid dated (date of bid) for the performance of the above named Contract (hereinafter called "the Bid")

KNOW ALL PERSONS by these present that WE (name of bank) of (address of bank) (hereinafter called "the Bank"), are bound unto NHPC Limited (a Govt. of India Enterprises) (hereinafter called "the Employer") for the sum of: (amount), for which payment well and truly to be made to the said Employer, the Bank binds itself, its successors and assigns by these presents.

THE CONDITIONS of this obligation are as follows:

1. If the Bidder (a) withdraws or modifies its bid during the period of bid validity, or (b) adopts corrupt or collusive or coercive or fraudulent practices or defaults under Integrity Pact.

2. If the Bidder, having been notified of the acceptance of its Bid by the Employer during the period of bid validity.
   a) Fails or refuses to sign the Contract Agreement when required, or
   b) Fails or refuse to submit the performance security in accordance with the Tender Documents.

We undertake to pay to the Employer up to the above amount upon receipt of its first written demand, without the Employer having to substantiate its demand, provided that in its demand the Employer will mention that the amount claimed by it is due, owing to the occurrence of one or both of the two above-named CONDITIONS, and specifying the occurred condition or conditions.

The Bank declares that this Bank Guarantee is issued by the bank, utilizing the credit limit of M/s……. (name of contractor).
This guarantee will remain in force up to and including (date 90 days after the period of bid validity), and

any demand in respect thereof must reach the Bank not later than the above date.
For and on behalf of the Bank_____
In the capacity of _____

Common Seal of the Bank with complete address including tel./fax. Nos.
Staff Authority No. of the officer of the Bank/Signatory

INSTRUCTIONS FOR EXECUTION OF BANK GUARANTEE FOR EANEST MONEY DEPOSIT

1. Bank Guarantee for Earnest Money Deposit should be executed on non-judicial Stamp papers of requisite value in accordance with the stamp Act if applicable to that particular state of Indian Union country of executing Bank, where executed. In case the same is issued by a first class International bank, the law prevalent in the country of execution shall prevail for the purpose of Stamp Duty on the Bank Guarantee. However, in such a case, the Bank Guarantee for Earnest Money Deposit shall be got confirmed by the Bidders through any Indian Scheduled/National bank.
2. The executing officers of the Bank Guarantee for Earnest Money/Bid Security shall clearly indicate in (block letters) his name, designation, Power of Attorney No. / Signing power No. as well as telephone/fax numbers with full correspondence address of the issuing Guarantee etc.

3. Each page of the Bank guarantee for earnest Money Deposit shall be duly signed/initialed by the executing officers and the last page shall be signed in full, indicating the particulars as aforesaid (sub-para 2) under the seal of the Bank.

4. Stamp paper shall be purchased in the name of Bank issuing the Bank Guarantee, after the date 'Notice Inviting Tender', not more than six (6) months prior to execution/issuance of the Bank Guarantee. The name of the purchaser should appear at the back side of stamp paper in the vendors Stamp. The issuing Bank shall be requested independently for verification/confirmation of the Bank Guarantee issued, non-confirmation of which may lead to rejection of 'Bid Security'.

5. Irrevocable, valid and fully enforceable Bank guarantee in favor of the employer (Name of Employer) issued by any scheduled bank approved by the Reserve bank of India which is acceptable to the Employer. The bank Guarantee issued by a Foreign bank shall be routed through the corresponding branch of such scheduled foreign banks in India or any scheduled Bank, acceptable to the employer.

6. Bank Guarantee for Bid security in original shall be submitted along with the Bid. However the issuing Bank shall submit an unstamped duplicate copy of bank Guarantee directly by registered post (A.D.) to the employer (authority inviting tenders) with a forwarding letter.

ANNEXURE-B

BANK GUARANTEE FORMAT FOR PERFORMANCE SECURITY

(To be stamped in accordance with Stamp Act
if any, of the Country of the issuing Bank)

Bank Guarantee No. .....
Date .....……

To,

NHPC Limited
NHPC Office Complex
Sector-33, Faridabad (Haryana) -121003 (India)

Dear Sirs,

In consideration of the ....[Employer's Name] ..... (hereinafter referred to as the

'Employer' which expression shall unless repugnant to the context or meaning thereof, include its successors, administrators and assigns) having awarded to M/s .....

[Contractor's Name] .... with its Registered/Head Office at .....

(hereinafter referred to as the 'Contractor', which expression shall unless repugnant to the context or meaning thereof, include its successors administrators, executors and assigns), a Contract by issue of Employer's Letter of Acceptance No. ..... dated

..... and the same having been acknowledged by the Contractor, for ...[Contract sum in figures and words] for ……. [Name of the work] and the Contractor having agreed to provide a Contract Performance Guarantee for the faithful performance of the entire Contract equivalent to ……(*)…….. of the said value of the aforesaid work under the Contract to the Employer.

We .....[Name & Address of the Bank] ..'..... having its Head Office at ..... (hereinafter referred to as the 'Bank', which expression shall, unless

repugnant to the context of meaning thereof, include its successors, administrators, executors and assigns) do hereby guarantee and undertake to pay the Employer, on

demand any and all money payable by the Contractor to the extent of ..... (*) ..... as aforesaid at any time upto ..... (@) ..... [days/month/year] without any demur, reservation, contest, recourse or protest and/or without any reference to the Contractor. Any such demand made by the Employer on the Bank shall be conclusive and binding notwithstanding any difference between the Employer and the Contractor or any dispute pending before any Court, Tribunal, Arbitrator or any other authority. The Bank undertakes not to revoke this guarantee during its currency without previous consent of the Employer and further agrees that the guarantees herein contained shall continue to be enforceable till the Employer discharges this guarantee or till …….(+)……[days/month/year] whichever is earlier.

The Employer shall have the fullest liberty, without affecting in any way the liability of the Bank under this guarantee, from time to time to extend the time for performance of the Contract by the Contractor. The Employer shall have the fullest liberty, without affecting this guarantee, to postpone from time to time the exercise of any powers vested in them or of any right which they might have against the Contractor, and to exercise the same at any time in any manner, and either to enforce or to forbear to enforce any covenants, contained or implied, in the Contract between the Employer and the Contractor or any other course or remedy or security available to the Employer. The Bank shall not be released of its obligations under these presents by any exercise by the Employer of its liberty with reference to the matters aforesaid or any of them or by reason of any other act or forbearance or other acts of omission or commission on the part of the Employer or any

other indulgence shown by the Employer or by any other matter or thing whatsoever which under law would, but for this provision have the effect of relieving the Bank.

The Bank declares that this Bank Guarantee is issued by the Bank, utilizing the credit limit of M/s……(name of the contractor) and also agrees that the Employer at its option shall be entitled to enforce this Guarantee against the Bank as a principal debtor, in the first instance without proceeding against the Contractor and notwithstanding any security or other guarantee the Employer may have in relation to the Contractor's liabilities.

i) Our liability under this Bank Guarantee shall not exceed ……(*)…….

ii) This Bank Guarantee shall be valid up to ……..(+)……..

iii) We are liable to pay the guaranteed amount or any part thereof under this Bank Guarantee only and only if Employer serve upon Bank a written claim or demand on or before ……..@.....

Dated this .....day of ..... 20..... at .....

WITNESS	Signed for and on behalf of the Bank
. .....	.....
(Signature)	(Signature)
.....	.....
(Name)	(Name)
.....	.....
(Official Address)	(Designation with Bank Stamp)/with Staff Authority No. Complete Address of Bank with Tel., Fax. No.

Notes:

1. This sum shall be **Five percent (5%)**of the (iii). Accepted Contract Amount denominated in the types and proportions of currencies.

   (@) This date will be Ninety (90) days beyond the issue of Defect liability Certificate as specified in the contract.

   (+) This date will be the date of issue of Defect liability Certificate.

2. Bank Guarantee should be executed on appropriate Stamp papers of requisite value, such stamp paper should be purchased in the name of Issuing Bank, not more than six (6) months prior to execution/issuance of Bank Guarantee. The name of the purchaser should appear at the back side of the stamp paper in the Vendors stamp. Bank Guarantee should contain rubber stamp of the authorized signatory of the bank indicating the name, designation, signature/Power of Attorney No. as well as telephone/fax numbers with full correspondence address of the Bank.

In case the same is issued by a first class international bank, the law prevalent in the country of execution shall prevail for the purpose of Stamp Duty on the Bank Guarantee. However, in such a case, the Bank Guarantee shall be got confirmed through any Indian Scheduled/Nationalized Bank.

3. Bank Guarantee is required to be submitted directly to the Employer by the issuing bank (on Behalf of the Contractor) under the registered post (A.D.). The Contractor can submit an advance copy of Bank Guarantee to the Engineer.

4. The issuing Bank shall write the name of bank's controlling branch/Head office along with contact details like telephone/ fax and full correspondence address in order to get the confirmation of BG from that branch/Head office, if so required.

5. Bidders shall communicate the following bank details to the issuing Bank for online confirmation of Bank Guarantee to be submitted in terms of this clause:
   Name of the beneficiary: **NHPC Limited.**
   Account No.: **11538537066.**
   IFSC Code: **SBIN0008844.**
   Address of the Bank: **State Bank of India, Khairi, Chamba (HP).**

****

Annexure-C

AGREEMENT

(To be executed on non-judicial stamp paper of appropriate value)

This AGREEMENT is made on the " day of "". BETWEEN """.

(1) NHPC Ltd., a Company registered under the Company Act, 1956, and having its principle place of business / registered office at NHPC OFFICE COMPLEX, SECTOR-33, FARIDABAD-121003, HARYANA (hereinafter called "the Purchaser"), and which expression shall include its permitted successors and assigns.

(2) M/s """""".. and having registered office at ""
""""""" (herein after referred to as "The Contractor") which expression shall include the permitted successors and assigns.

This Contract comprises of the following component / parts, all of which form an integral part of this contract as shall if herein set out verbatim or if not attached as if here to attached.

i) Letter of Award & Schedules of quantities and Prices

ii) ATC, Special Conditions of Contract, Scope of Work

iii) Technical Specifications, Drawing &QAP (if any)

iv) Any other document required as a part of contract

NOW THESE PRESENT WITNESS AND the parties hereto hereby agree and declares as follows. That is to say, in consideration of the payments to be made to the Supplier by the purchaser as hereinafter mentioned. The Supplier shall supply the Goods and perform related services in the contract within and at the times and in the manner and subject to terms & conditions and stipulations mentioned in the said contract document.

AND in consideration of the due provision and satisfactory supply of the said Good and related services, the Purchaser will pay to the Supplier the sums as per the Schedule of Quantities and Prices construed in Section-1 or such other as may become payable to the Supplier under the Contract, such payment to be made in time and in such manner as is provided by the contract.

IN WITNESS WHREOF the Parties hereto have signed this deed hereunder on the date respectively mentioned against the signature of each.

(For and on behalf of the Contractor)	(For and on behalf of the Employer)
In the presence of	In the presence of
1.	1.
2.	2.

****

SECTION-II

Schedule of Quantity (BOQ)

Schedule of Quantities/BoQ

Name of the work: Supply & installation of "11KV Vacuum Circuit Breaker" alongwith panel & accessories in Switchyard of Chamera Power Station-I

Sl. No.	Description	Qty	UoM	GST %	HSN Code
1.	Supply of 11KV Vacuum Circuit Breakers along with Panel, auxiliaries and spares at Switchyard Complex of Chamera Power Station-I	4	Nos		
2.	Dismantling of existing 11KV Circuit Breakers along with Panel and installation, testing and commissioning of 11KV Vacuum Circuit Breakers along with Panel.	1	LS		
Total Amount (₹)					

Note: Bidder is required to quote total price including all taxes & charges etc for the tender against the estimated cost of **Rs.41,53,600/- (including freight & GST).** However, on demand, the bidder shall provide the Price breakup if required by the buyer.

SECTION-III

FORMS & PROCEDURES

ANNEXURE-I

(to be filled and uploaded online)

BID PROFORMA

Sl.No.	Description of information	Replies by the bidder
1.	Name of the firm :	
2.	Complete address of Regd./Head Office i) Postal :Telephone/Fax ii) E-mail :	
3.	Former name of the Firm (if any) :	
4.	Type of the firm (Proprietary/Partnership/ Private Ltd. Co./ Public Ltd. Co.)	
5.	Whether MSE or Start-Up: (tick in the appropriate box)	MSE | Start-Up |
6.	Year and place established :	
7.	Are you registered with any Government: Public Sector Undertaking/DGS&D/NSIC (if yes, give Details) for supply of similar Items/Equipments covered under the Specifications	
8.	Have your Company ever been declared Bankrupt: (ifyes, give details)?	
9.	Validity period of tender, reckoned from the last date of online bid submission :	**120 days**
10.	Whether all technical particulars, drawings etc., are furnished and filled: in all schedules, appended to the tender documents.	

11. Rate of Taxes & Duties : (Mention here only % rates asapplicable)

1. Supply/Installation: : .....(%)

a) GST : .....(%)

b) Any Other Tax, If any

2. Transportation Charges: : .....(%)

a) GST : .....(%)

b) Any other taxes & duties etc.

12. Goods & Services Tax Identification No. (GSTIN):

13. Whether all terms & conditions and technical specifications as per NIT are accepted: Yes / No

Station:_____

Date:_____

For &on behalf of:_____

Signature:_____

Name:_____

Designation:_____

(*of the authorized representative of the bidder*)

Official Seal of the Company:

ANNEXURE-II

(to be filled and uploaded online)

ECS-Form

NHPCLimited

ELECTRONIC CLEARING SERVICE (CREDIT CLEARING)

(PAYMENT TO PARTIES THROUGH CREDIT CLEARING MECHANISM)

No.:

1. BIDDER'S NAME :_____

a) ADDRESS :_____

_____

_____

b) Phone/Mobile No. :_____

2. PARTICULARS OF BANK ACCOUNT:

a) BANK NAME :_____
b) BRANCH NAME :_____
c) ADDRESS :_____
Telephone No. :_____

d) IFSC CODE OF THE BANK :(For payment through RTGS)

e) ACCOUNTTYPE :(S.B. Account / Current Account or /Cash Credit with code10/11/13)

f) ACCOUNT NUMBER :_____(As appearing on the Cheque Book)

I hereby declare that the particulars given above are correct and complete. If the transaction is delayed or not effected at all for reasons of incomplete or incorrect Information, I would not hold the user Company responsible.

(----------)

Date: Signature of the Bidder

Certified that the particulars furnished above are correct as per our records.

(Bank's Stamp)

(----------)

Date: Signature of the Authorized Official from the Bank

ANNEXURE-III
(to be filled and uploaded online)

DECLARATION / UNDERTAKING under MSMED Act, 2006
(As per guidelines issued by Ministry of MSME time to time)

A) I/We confirm that the provisions of Micro, Small & Medium Enterprise are applicable/not applicable to us and our organization falls under the definition of:

(i) [ ]- Micro Enterprise

(ii) [ ]- Small Enterprise

(iii) [ ]- Medium Enterprise

Please tick in the appropriate option box [ ] and attach documents/certificate, if any.

B) I/We also confirm that We are MSEs owned by SC/ST Entrepreneurs **(Strike out if not applicable)**

C) I/We also undertake to inform the change in this status as aforesaid during the currency of the contract, if any.

(Authorized Representative of Firm)

Annexure-IV
(to be filled and uploaded online)

DECLARATION REGARDING APPLICABILITY OF START-UPs UNDER START-UP INDIA INTIATIVE

A) I/We confirm that the provisions of Startup India Initiatives are:

[ ] Applicable to us and our organization falls under the definition of Startups.

[ ] Not applicable to us and our organization does not fall under the definition of Startups.

Please (tick) the appropriate box [ ] and attach documents / certificates, if any.

B) I/We also undertake to inform the change in this status as aforesaid during the currency of the contract, if any.

(Authorized Representative of Firm)

ANNEXURE-V

(to be filled and uploaded online)

DECLARATIONS
(to be submitted by bidder)

Sl. No.	Declaration Type	Declaration	Acceptance/ Rejection
1.	No Deviation Declaration	This is to certify that our offer is exactly in line with your tender enquiry. This is to expressly certify that our offer contains no deviation either Technical or Commercial in either director in direct form.	
2.	Undertaking	We hereby undertake that we have studied and understood all the terms and conditions as mentioned in tender document (including ATC, Integrity Pact, Scope of work and Technical Specifications of work) and we agree to abide by the same unconditionally.	
3.	Correctness of bid	We hereby declare that information furnished with Bid is correct in all respect.	

Signature & Seal of Bidder

ANNEXURE-VI

[to be filled and uploaded online (scanned copy]

(Format for declaration by the Bidder)

"Self-Declaration by the Bidder"

I/We,M/s_____ (Name of Bidder) hereby certify that proceedings for insolvency under the Insolvency and Bankruptcy code 2016, or as amended from time to time, have not started, against us and/or our Parent/Holding company _____ (Name of Parent/Holding company).

(Seal & Signature of Bidder)

Note: This 'Declaration' should be ***on the letter head of Bidder.***

ANNEXURE-VII

Format for Self Certification under Preference to "MAKE IN INDIA" Policy

(Refer Clause No. 2.8 & 3.4.4 of ITT)

CERTIFICATE

In line with Government Public Procurement (Preference to Make in India) Order No. P-45021/2/2017-BE-II dt. 15.06.2017, as amended from time to time and as applicable on the date of submission of tender, we hereby certify that we M/s_____ (supplier name) are local supplier meeting the requirement of minimum Local content (%) as defined in above orders for the material against Tender No_____

Details of location at which local value addition will be made is as follows:

Item Description	Country of Origin	Class / %of Local Content
Supply & installation of 11KV Vacuum Circuit Breaker alongwith panel& accessories in Switchyard of Chamera Power Station-I. (as per SoQ and Technical Specifications)		

We also understand, false declarations will be in breach of the Code of Integrity under Rule 175(1)(i)(h) of the General Financial Rule for which for which a bidder or its successors can be debarred for up two years as per Rule 151 (iii) of the General Financial Rules along with such other actions as may be permissible under law.

Seal and Signature of Authorized Signatory

Note: This 'Declaration' should be on the letter head of Manufacturer/bidder.

Annexure-VIII
(to be filled and uploaded online)

Undertaking by Bidder towards Anti-Profiteering Clause of GST Act/Rules

(To be submitted on Letterhead)

To,

NHPC Ltd.

Sub: Tender No.
……

Dear Sir,

We, M/s…….. (Name of Bidder) have submitted bid dt: …….. for the aforesaid tender.

Section 171 of CGST Act stipulates that it is mandatory to pass on the benefit of reduction in rate of tax on supply of Goods or Services or availability of Input Tax Credit, by way of commensurate reduction in price.

Accordingly, it is certified that we have duly considered the impact of Input Tax Credit available on supplies in the GST regime, in our quoted price. Further, any additional benefit of ITC if available shall be passed on to the employer.

Further, we hereby confirm that our quoted prices are duly considered maximum possible benefits available and are in compliance with the aforesaid Section 171 of CGST Act/IGST Act.

Further, if any refund on account of GST is received from the Government in further by the Contractor/ Supplier under any GST Refund/Exemption or Subsidy Scheme, the same shall be passed on to the Employer.

In case this declaration is found faulty in any manner, we shall be fully responsible for the consequential effect including making good of any losses of interest etc. to NHPC Ltd.

Place:
Date:

(Signature of Authorized Signatory of Bidder)
Name:
Designation:
Seal:

ANNEXURE-IX

[To be uploaded online (scanned copy)]

Declaration for Income Tax Return Filing Status
(u/s 206AB/206CCA of Income Tax Act.1961)
(To be submitted on letter head)

We hereby confirm that we have field the income Tax Return (ITR) for last financial year for which the time limit of filling return of income u/s 139(1) has already expired as on the date of this declaration

1. Status of filing of Return of income:-

Financial year	Acknowledgment ITR Number	Date of filing
Previous year immediately preceding the financial year in which tax is to be deducted / collected		

2. Threshold limit for tax deducted at source ('TDS') and tax collected at source ('TCS')

This is to declare that the aggregate of TDS and TCS for Financial Years (Previous year immediately preceding the financial year in which tax is to be deducted / collected) is Excess of 50,000/- in our case.

3. OUR PAN number is:-

4. We further declare that information furnished above is true and correct. In case any part of the above declaration is untrue/false, we undertake to indemnify the Company shall recover the TDS amount from us along with Interest and Penalty.
5. The ITR Acknowledgments/ screen shot from the income tax website indicating the filling of return for Previous year immediately preceding the financial year in which tax is to be deducted / collected is enclosed herewith.
6. The ITR Acknowledgments/ screen shot from the income tax website indicating the filing of return for Previous year immediately preceding the financial year in which tax is to be deducted / collected shall be submitted after filing the same within the time allowed under Section 139 (1) of income tax Act. 1961.

Place:
Date:

[Signature of Authorized Signatory of Bidder]
Name:
Designation:

Note: *The bidder is required to submit copy of ITR Acknowledgment in support of above declaration.*

ANNEXURE-X

(To be submitted by the bidder on Company's letterhead)

I/We have read the clause regarding restrictions on procurement from a bidder of a country which shares a land border with India; I/We certify that M/s ……(mention bidder name) is not from such a country or, if from such a country, has been registered with the Competent Authority. I/We hereby certify that M/s…… (Mention bidder name) fulfills all requirements in this regard and is eligible to be considered.

Evidence of valid registration by the Competent Authority is hereby attached.

Date …….. 2022 Signature :……

ANNEXURE-XI

(To be filled and uploaded online)

(Format for declaration by the Bidder)

Self-Declaration by the Bidder

I/We, M/s_____ (Name of Bidder) hereby certify

That I/We have not been banned/de-listed/blacklisted/debarred from business on the grounds mentioned in para 6 of Guidelines on Banning of Business dealings (Annexure-A to Integrity Pact).

I/We, M/s_____(Name of Bidder) hereby further certify that I/We have not been declared ineligible under para 6 of Guidelines on Banning of Business Dealings.

(Seal & Signature of Bidder)

*Note: This 'Declaration' should be **on the letter head** of Bidder*

ANNEXURE-XII

(To be filled and uploaded online)

(To be executed on plain paper at the time of submission of bid/ and on Non-judicial stamp paper of appropriate value by successful Bidder (Contractor) prior to signing of Contract Agreement)

(Format of Integrity Pact)

PRE-CONTRACT INTEGRITY-PACT

Between

NHPC Limited, a company incorporated under the Companies Act 1956 and having its registered office at NHPC Office Complex, Sector-33, Faridabad-121003 (Haryana), hereinafter referred to as " The Employer" which expression shall mean and include, unless the context otherwise requires, his successors in office and assigns of the **First Part.**

And

M/s _____ , a company/ firm/ individual (status of the company) and having its registered office at represented by Shri _____ , hereinafter referred to as "The Bidder/Contractor" which expression shall mean and include, unless the context otherwise requires, his successors and permitted assigns of the **Second Part**.

WHEREAS the Employer proposes to procure under laid down organizational procedures, contract/s for Supply & installation of **"11KV Vacuum Circuit Breaker" alongwith panel & accessories in Switchyard of Chamera Power Station-I"** (Name of the work/ goods/ services) and the Bidder/Contractor is willing to offer against NIT No. …….

WHEREAS the Bidder/Contractor is a private company / public company/Government undertaking/partnership/consortium/joint venture constituted in accordance with the relevant law in the matter and the Employer is a Public Sector Enterprise.

NOW, THEREFORE,

To avoid all forms of corruption by following a system that is fair, transparent and free from any influence/prejudiced dealings prior to, during and subsequent to the currency of the contract to be entered into with a view to:-

Enabling the Employer to obtain the desired said (work/ goods/ services) at a competitive price in conformity with the defined specifications by avoiding the high cost and the distortionary impact of corruption on public procurement, and

Enabling the Bidder(s)/Contractor(s) to abstain from bribing or indulging in any corrupt practice in order to secure the contract by providing assurance to them that their competitors will also abstain from bribing and other corrupt practices and the Employer will commit to prevent corruption, in any form, by its officials by following transparent procedures.

1.0 Commitments of the Employer

1.1 The Employer undertakes that no official of the Employer, connected directly or indirectly with the contract, will demand, take a promise for or accept, directly or through intermediaries, any bribe, consideration, gift, reward, favour or any material or immaterial benefit or any other advantage from the Bidder/Contractor, either for themselves or for any person, organization or third party related to the contract in exchange for an advantage in the bidding process, bid evaluation, contracting or implementation process related to the contact.

1.2. The Employer will, during the pre-contract stage, treat all the Bidders/Contractors alike, and will provide to all the Bidders/Contractors the same information and will not provide any such information to any particular Bidder/Contractor which could afford an advantage to that particular Bidder/Contractor in comparison to other Bidders/Contractors.

1.3. All the officials of the Employer will report to the appropriate Authority any attempted or completed breaches of the above commitments as well as any substantial suspicion of such a breach.

2.0 In case any such preceding misconduct on the part of such official(s) is reported by the Bidder to the Employer with full and verifiable facts and the same is prima facie found to be correct by the Employer, necessary disciplinary proceedings, or any other action as deemed fit, including criminal proceedings may be initiated by the Employer or Independent External Monitor and such a person shall be debarred from further dealings related to the contract process. In such a case while an enquiry is being conducted by the Employer the proceedings under the contract would not be stalled.

3.0 Commitments of the Bidder(s)/Contractor(s)

The Bidder(s)/Contractor(s) commits itself to take all measures necessary to prevent corrupt practices, unfair means and illegal activities during any stage of its bid or during any pre-contract or post-contract stage in order to secure the contract or in furtherance to secure it and in particular commit themselves to observe the following principles during participation in the tender process and during contract execution:

3.1. The Bidder(s)/Contractor(s) will not offer, directly or through intermediaries, any bribe, gift, consideration, reward, favour, any material or immaterial benefit or other advantage, commission, fees, brokerage or inducement to any official of the Employer, connected directly or indirectly with the bidding process, or to any person, organization or third party related to the contract in exchange for any advantage in the bidding, evaluation, contracting and implementation of the contract.

3.2 The Bidder/Contractor further undertakes that it has not given, offered or promised to give, directly or indirectly any bribe, gift consideration, reward, favour, any material or immaterial benefit or other advantage, commission, fees, brokerage or inducement to any official of the Employer or otherwise in procuring the Contract or forbearing to do or having done any act in relation to the obtaining or execution of the contract or any other contract with Employer for showing or forbearing to show favour or disfavour to any person in relation to the contract or any other contract with Employer.

3.3 The Bidder(s)/Contractor(s) shall disclose the name and address of agents and representatives and Indian Bidder(s)/Contractor(s) shall disclose their foreign principals or associates.

3.4 The Bidder(s)/Contractor(s) shall, when presenting their bid, disclose any/ all payments made, is committed to or intends to make to agents, brokers or any other intermediaries, in connection with this bid/award of the contract.

3.5 Deleted.

3.6 The Bidder, either while presenting their bid or during pre-contract negotiations or before signing the contract, shall disclose any payments made, is committed to or intends to make to officials of the Employer or their family members, agents, brokers or any other intermediaries in connection with the contract and the details of services agreed upon for such payments.

3.7 The Bidder/Contractor will not collude with other parties interested in the contract to impair the

transparency, fairness and progress of the bidding process, bid evaluation, contracting and implementation of the contract.

3.8 The Bidder/Contractor will not accept any advantage in exchange for any corrupt practice, unfair means and illegal activities.

3.9 The Bidder/Contractor shall not use improperly, for purposes of competition or personal gain, or pass on to others, any information provided by the Employer as part of the business relationship, regarding plans, technical proposals and business details, including information contained in electronic data carrier. The Bidder/Contractor also undertakes to exercise due and adequate care lest any such information is divulged.

3.10 The Bidder(s)/Contractor(s) commits to refrain from giving any complaint directly or through any other manner without supporting it with full and verifiable facts.

3.11 The Bidder(s)/Contractor(s) shall not instigate or cause to instigate any third person to commit any of the actions mentioned above.

3.12 If the Bidder/Contractor or any employee of the Bidder/Contractor or any person acting on behalf of the Bidder/Contractor, either directly or indirectly, is a relative of any of the officers of the Employer, or alternatively, if any relative of an officer of the Employer has financial interest/stake in the Bidder(s)/Contractor(s) firm(excluding Public Ltd. Company listed on Stock Exchange), the same shall be disclosed by the Bidder/Contractor at the time of filling of tender.

The term 'relative' for this purpose would be as defined in Section 2(77) of the Companies Act 2013.

3.13 The Bidder(s)/Contractor(s) shall not lend to or borrow any money from or enter into any monetary dealings or transactions, directly or indirectly, with any employee of the Employer.

3.14 The representative of the Bidders(s)/ Contractor(s) signing Integrity Pact shall not approach the Courts while representing the matters to IEMs and he/she will wait their decision in the matter.

3.15 In case of sub-contracting, the bidder/ principal contractor shall take the responsibility of the adoption of Integrity Pact by the sub-contractor.

4.0 Previous Transgression

4.1 The Bidder(s)/Contractor(s) declares that no previous transgression occurred in the last three years immediately before signing of this Integrity Pact, with any other company in any country in respect on any corrupt practices envisaged hereunder or with any Public Sector Enterprise in India or any Government Department in India.

5.0 Earnest Money (Security Deposit)

The provision regarding Earnest Money/Security Deposit as detailed in the Notice Inviting Tender (NIT).

6.0 Sanctions for Violations

6.1 Any breach of the aforesaid provisions, before award or during execution by the Bidder/Contractor or any one employed by it or acting on its behalf such as to put their reliability or credibility in question, shall entitle the Employer to take action as per the procedure mentioned in the "**Guidelines on Banning of Business Dealings**" attached as **Annexure-A to Integrity Pact** and initiate all or any one of the following actions, wherever required:-

(i) To immediately call off the pre contract negotiations without assigning any reason or giving any compensation to the Bidder/Contractor. However, the proceedings with the other Bidder(s)/Contractor(s) would continue.
(ii) The Earnest Money Deposit (in pre-contract stage) and/or Security Deposit/Performance Bond (after the contract is Signed) shall stand forfeited either fully or partially, as decided by the Employer and the Employer shall not be required to assign any reason thereof.
(iii) To immediately cancel the contract, if already signed, without giving any compensation to the Contractor. The Bidder/Contractor shall be liable to pay compensation for any loss or damage to the Employer resulting from such cancellation/rescission and the Employer shall be entitled to deduct the amount so payable from the money(s) due to the Bidder/Contractor.
(iv) Deleted.
(v) To encash the Bank guarantee, in order to recover the dues if any by the Employer, along with interest as per the provision of contract.
(vi) Deleted .

(vii) To debar the Bidder/Contractor from participating in future bidding processes of NHPC Ltd., as per provisions of "Guidelines on Banning of Business Dealings" of NHPC Ltd. (**Annexure-A to Integrity Pact**), which may be further extended at the discretion of the Employer.
(viii) To recover all sums paid in violation of this Pact by Bidder(s)/Contractor(s) to any middleman or agent or broker with a view to securing the contract.
(ix) In cases where irrevocable Letters of Credit have been received in respect of any contract signed by the Employer with the Bidder/ Contractor, the same shall not be opened/operated.
(x) Forfeiture of Performance Security in case of a decision by the Employer to forfeit the same without assigning any reason for imposing sanction for violation of this Pact.

6.2 The Employer will be entitled to take all or any of the actions mentioned at para 6.1 (i) to (x) of this Pact also on the Commission by the Bidder/Contractor or any one employed by it or acting on its behalf (whether with or without the knowledge of the Bidder/Contractor), of an offence as defined in Chapter IX of the Indian Penal Code, 1860 or Prevention of Corruption Act, 1988 or any other statute enacted for prevention of corruption.

6.3 The decision of the Employer to the effect that a breach of the provisions of this Pact has been committed by the Bidder/Contractor shall be final and conclusive on the Bidder/Contractor. However, the Bidder/Contractor can approach the Independent External Monitor(s) appointed for the purposes of this Pact.

7.0 Independent External Monitor(s)
7.1 The Employer has appointed Independent External Monitors (hereinafter referred to as monitors) for this Pact after approval by the Central Vigilance Commission.

7.2 The task of the Monitors shall be to review independently and objectively, whether and to what extent the parties comply with the obligations under this Pact.

7.3 The Monitors shall not be subject to instructions by the representatives of the parties and perform their functions neutrally and independently. The Monitors report to CMD, NHPC.

7.4 Both the parties accept that the Monitors have the right to access all the Contract documents relating to the project/procurement, including minutes of meetings, whenever required. The right to access records should only be limited to the extent absolutely necessary to investigate the issue related to the subject tender/contract.

7.5 As soon as the Monitor notices, or has reason to believe, a violation of this Pact, he/she will so inform CMD, NHPC and request NHPC Ltd. to discontinue or take corrective action, or to take other relevant action. The Monitor can in this regard submit non-binding recommendations. Beyond this the Monitor has no right to demand from the parties that they act in a specific manner, refrain from action or tolerate action.

7.6 The Bidder(s)/Contractor(s) accepts that the Monitor has the right to access without restriction, to all Project documentation of the Employer including that provided by the Bidder/Contractor. The Bidder/Contractor will also grant the Monitor, upon his/her request and demonstration of a valid interest, unrestricted and unconditional access to their project documentation. The same is applicable to Subcontractor(s). The Monitor shall be under contractual obligation to treat the information and documents of the Bidder/Contractor/Subcontractor(s) with confidentiality. The Monitor has also signed declaration on 'Non-Disclosure Agreement' and of 'Absence of Conflict of Interest'. In case of any conflict of interest arising at an later date, the IEM shall inform CMD, NHPC and recuse himself/ herself from that case.

7.7 The Employer will provide to the Monitor sufficient information about all meetings among the parties related to the project provided such meetings could have an impact on the contractual relations between the parties. The parties will offer to the Monitor the option to participate in such meetings as and when required.

7.8 The Monitor will submit a written report to the CMD, NHPC Ltd., within 8 to 10 weeks from the date of reference or intimation to him by the Employer/Bidder and should the occasion arise, submit proposals for correcting problematic situations.
7.9 The word 'Monitor' would include both singular and plural.

8.0 Facilitation of Investigation
In case of any allegation of violation of any provisions of this Pact or payment of commission, the Employer or its agencies shall be entitled to examine all the documents including the Books of Accounts of the Bidder/Contractor and the Bidder/Contractor shall provide necessary information and documents in English and shall extend all possible help for the purpose of such examination.

9.0 Law and Place of Jurisdiction
This Pact is subject to Indian Law. The place of performance and jurisdiction is the Registered Office of the Employer, i.e. Faridabad (Haryana). The arbitration clause provided in the tender document/contract shall not be applicable for any issue/dispute arising under Integrity Pact.

10.0 Other Legal Actions
10.1 The actions stipulated in this Integrity Pact are without prejudice to any other legal action that may follow in accordance with the provisions of the extant law in force relating to any civil or criminal proceedings.

10.2 Changes and supplements as well as termination notice need to be made in writing.

10.3 If the Contractor is a partnership or a consortium or a joint venture, this pact must be signed by all partners of the consortium/joint venture.

11.0 Validity
11.1 The validity of this Integrity Pact shall be from date of its signing and expires for the Contractor 12months after the last payment under the contract, and for all other Bidders 6 months after the contract has been awarded. Any violation of the same would entail disqualification of the bidders and

exclusion from business dealings.

11.2 Should one or several provisions of this Pact turn out to be invalid, the remainder of this Pact shall remain valid. In this case, the parties will strive to come to an agreement to their original intention.

11.3 Issues like Warranty/ Guarantee etc. shall be outside the purview of IEMs.

11.4 In the event of any contradiction between Integrity Pact and its Annexure, the clause in the Integrity Pact will prevail.

For & On behalf of the Employer	For & On behalf of the Bidder/Contractor
(Office Seal)	(Office Seal)
Place----------	Place----------
Date----------	Date----------
Witness1._____	Witness1._____
(Name and address)	(Name and address)
2._____	2._____
(Name and address)	(Name and address)

Annexure-A to Integrity Pact

Guidelines on Banning of Business Dealings

1.0 Introduction

1.1 NHPC Limited (NHPC) deals with Agencies viz. parties/ Contractors/ suppliers/ bidders, who are expected to adopt ethics of highest standards and a very high degree of integrity, commitments and sincerity towards the work undertaken. It is not in the interest of NHPC to deal with Agencies who commit deception, fraud or other misconduct in the tendering process and/or during execution of work undertaken. NHPC is committed for timely completion of the Projects within the awarded value without compromising on quality.

1.2 Since suspension/ banning of business dealings involves civil consequences for an Agency concerned, it is incumbent that adequate opportunity of hearing is provided and the explanation, if tendered, is considered before passing any order in this regard keeping in view the facts and circumstances of the case.

2.0 Scope

2. 1 NHPC reserves its rights to remove from list of approved suppliers / Contractors (if such list exists) or to Suspend/Ban Business Dealings if any Agency has been found to be non / poor performing or have committed misconduct or fraud or anything unethical or any of its action(s) which falls into any such grounds as laid down in this policy.

2.2 The procedure of (i) Removal of Agency from the List of approved suppliers / Contractors; (ii) Suspension and (iii) Banning of Business Dealing with Agencies, has been laid down in these guidelines.

2.3 These guidelines shall apply to all the units of NHPC.

2.4 These guidelines shall not be applicable in Joint Venture, Subsidiary Companies of NHPC unless they are assignees, successors or executor.

2.5 The suspension/banning except suspension/banning under Integrity Pact shall be with prospective effect, i.e. future business dealings.

3.0 Definitions

In these Guidelines, unless the context otherwise requires:

i) ***"Agency/ Party/ Contractor/ Supplier/ Bidders/ Vendors"*** *shall mean and include a public limited company or a private limited company, a joint Venture, Consortium, HUF, a firm whether registered or not, an individual, cooperative society or an association or a group of persons engaged in any commerce, trade, industry, etc. "Party / Contractor/ Supplier / Bidder/Vendor" in the context of these guidelines is indicated as 'Agency'.*

ii) ***"Unit"*** *shall mean the Corporate Office, Project/ Power Station/ Regional Office/ Liaison Office or any other office of NHPC.*

*iii) "****Competent*** *Authority****"*** *and '****Appellate Authority'*** *shall mean the following:*

a. For works awarded/under Tendering from corporate office (falling in the competency of CMD /Board of Directors)

- Competent Authority: CMD
- Appellate Authority : Board of Directors

b. For works awarded/under Tendering from Corporate Office/Projects/ Power Stations/ Regional Offices/Liaison Offices (falling in the competency of Director /Executive Director)

- Competent Authority: Concerned Director/Executive Director as the case may be
- Appellate Authority: CMD /Concerned Director as the case may be

c. For works awarded/under Tendering from Corporate Office/ Regional Offices / Projects/ Power Stations/ Liaison Offices (falling in the competency of CGM and below)

- Competent Authority in case of works awarded/ under Tendering from Corporate Office / Regional Office shall be CGM or GM of the concerned division as the case may be.
- Competent Authority: Head of the Unit not below the rank of General Manager
- Appellate Authority: Next higher authority

iv) **"Investigating Committee"** shall mean a Committee appointed by Competent Authority to conduct investigation.

4.0 Initiation of Banning / Suspension

Action for Suspension / Banning Business Dealings with any Agency shall be initiated by the department responsible for invitation of Bids/Engineer-in-charge after noticing the irregularities or misconduct on the part of Agency concerned. Besides the concerned department, Vigilance Department of each Unit/ Corporate Vigilance may also be competent to initiate such action.

5.0 Suspension of Business Dealings.

5.1 If the conduct of any Agency dealing with NHPC is under investigation, the Competent Authority may consider whether the allegations (under investigation) are of a serious nature and whether pending investigation, it would be advisable to continue business dealing with the Agency. If the Competent Authority, decides that it would not be in the interest to continue business dealings pending investigation, it may suspend business dealings with the Agency. The order of suspension would operate for a period not more than six months and may be communicated to the Agency as also to the Investigating Committee. The Investigating Committee may ensure that their investigation is completed and whole process of final order is over within such period. However if the investigations are not completed within six months ,the investigation committee shall put up the proposal to the competent authority for approval of extension of time maximum up to further three months with in which the committee shall conclude the proceedings .

5.2 The order of suspension shall be effective throughout NHPC in case of work falling in the Competency of CMD/ Board of Directors/Directors, in case of work falling in the competency of Executive Director suspension shall be effective throughout Region / Corporate Office (in case the works awarded/ under Tendering from Corporate office). In case of work falling in the competency of HOP and below suspension shall be effective throughout the Project/Power Station and attached liaison offices/units and in case of work falling under the competency of CGM and below at Corporate Office suspension shall be effective at Corporate Office. During the period of suspension, no business dealing shall be held with the Agency.

5.3 If the Agency concerned asks for detailed reasons of suspension, the Agency may be informed

that its conduct is under investigation. It is not necessary to enter into correspondence or argument with the Agency at this stage.

5.4 It is not necessary to give any show-cause notice or personal hearing to the Agency before issuing the order of suspension.

5.5 The format for intimation of suspension of business dealing is placed at **Appendix– I**

6.0 Ground on which Banning of Business Dealings can be initiated

6.1 If the security consideration, including questions of loyalty of the Agency to NHPC so warrants;

6.2 If the director /owner of the Agency, proprietor or partner of the firm, is convicted by a Court of Law for offences involving moral turpitude in relation to its business dealings with the Government or any other public sector enterprises, during the last five years;

6.3 If the Agency has resorted to Corrupt, Fraudulent, Collusive, Coercive practices including misrepresentation of facts and violation of the any provisions of the Integrity Pact provided in the Contract.

6.4 If the Agency uses intimidation / threatening or brings undue outside pressure on NHPC or its official for acceptance / performances of the job under the contract;

6.5 If the Agency misuses the premises or facilities of NHPC, forcefully occupies or damages the NHPC's properties including land, water resources, forests / trees or tampers with documents/records etc.

6.6 If the Agency does not fulfilthe obligations as required under the Contract and Violates terms & conditions of the contract which has serious affect for continuation of the Contract.

6.7 If the work awarded to the agency has been terminated by NHPC due to poor performance of the contract in the preceding 5 years.

6.8 If the Central Vigilance Commission, Central Bureau of Investigation or any other Central Government investigation Agency recommends such a course in respect of a case under investigation or improper conduct on agency's part in matters relating to the Company (NHPC) or even otherwise;

6.9 On any other ground upon which business dealings with the Agency is not in the public interest.

6.10 If business dealings with the Agency have been banned by the Ministry of Power, Government of India OR any PSU/ any other authority under the MOP if intimated to NHPC or available on MOP Website, the business dealing with such agencies shall be banned with immediate effect for future business dealing except banning under Integrity Pact without any further investigation.

(Note: The examples given above are only illustrative and not exhaustive. The Competent Authority may decide to ban business dealing for any good and sufficient reason).

7.0 Procedure for Banning of Business Dealings

7. 1 An Investigating Committee shall be constituted by the authority competent to Ban the dealing comprising members from Engineering/Indenting department (convener), Finance, Law and Contract. The level of the committee members shall be CGM and above for works falling in the competency of CMD/ Board of Directors, General Manager and above for the works falling in

the competency of Director/ Executive Director and DGM/SM with at least one member of the level of General Manager for works falling in the competency of CGM and below.

7.2 The order of Banning of Business Dealings shall be effective throughout the NHPC. During the period of Banning of Business Dealings, no Business Dealing shall be held with the Agency.

7.3 The functions of Investigating Committee in each Unit to be appointed by the competent authority in line with para 3 (iii) shall, inter-alia include:

a) To study the report of the department responsible for invitation of bids and decide if a prima-facie case for banning exists, if not, send back the case to the Competent Authority.

b) To recommend for issue of show-cause notice (after vetting by legal deptt.) to the Agency by the concerned department as per clause 7.4 "Show Cause Notice".

c) To examine the reply to show-cause notice and call the Agency for personal hearing, if required.

d) To submit final recommendations to the Competent Authority for banning or otherwise including the period for which the ban would be operative considering the implication for NHPC on account of the act/omission on the part of the agency, intention of the agency as established from the circumstances of the case etc.

7.4 Show Cause Notice

Once the proposal for issuance of Show Cause Notice is approved by the Competent Authority, a 'Show Cause Notice' (as per format at **Appendix-II** of these guidelines) shall be issued to the delinquent Agency by the Competent Authority or by a person authorized by the Competent Authority for the said purpose. The Agency shall be asked to submit the reply to the Show Cause Notice within 15 days of its issuance. Further, the Agency shall be given an opportunity for Oral hearing to present its case in person, if it so desires, and the date for Oral Hearing shall necessarily be indicated in the Show Cause Notice.

The purpose of issuing the Show Cause Notice is only that the Agency concerned shall be given an opportunity to explain their stand before any action is taken. The grounds on which action is proposed to be taken shall be disclosed to the Agency inviting representation and after considering that representation, orders may be passed. Such orders require only the satisfaction of the authority that passed the final orders.

If the Agency requests for inspection of any relevant document in possession of NHPC, necessary facility for inspection of documents may be provided.

During the conductance of oral hearing, only the regular duly authorized employees of Agency will be permitted to represent the Agency and no outsider shall be allowed to represent the Agency on its behalf.

Reply to the Show Cause Notice given by the Agency and their submissions in oral hearing, if any, will be processed by the Committee for obtaining final decision of the Competent Authority in the matter.

In case, no reply to Show Cause Notice is received from the Agency within stipulated time, further reminder shall be given with further period of 10 days thereafter if no reply is received action for processing ex-parte against the concerned Agency shall be initiated.

7.5 Speaking Order

The speaking order (reasoned order) for banning the business dealing with the Agency shall be issued by the Competent Authority or by a person authorized for the said purpose.

The decision regarding banning of business dealings taken after the issue of a Show Cause Notice and consideration of representation, if any, in reply thereto, shall be communicated to the Agency concerned along with a reasoned order. The fact that the representation has been considered shall invariably be mentioned in the communication. Also the fact that if no reply was received to the Show Cause Notice shall invariably be indicated in the final communication to the Agency. The format for intimation of banning of business dealing is placed at **Appendix–III**

7.6 Period of banning

In case banning is processed for violation of provisions of Integrity pact or due to corrupt or fraudulent practices, the competent authority shall decide on the period of banning on the case to case basis depending on the gravity of the case and considering the implications for NHPC on account of the ac/omission on the part of the agency, intention of the agency as established from the circumstances of the case etc. The period of banning shall not be less than 6 months and shall not exceed 2 years and in case termination of contract due to poor performance the period of banning shall be for 5 years. For contracts awarded to JV/Consortium, a constituent of the JV shall be permitted to participate in the bidding process if it has not been banned on grounds of its role and responsibility in the tendering process for which the Joint Venture has been banned in Past. In case if the Joint Venture which has been banned does not indicate the roles and responsibility of individual Partner(s) then, the partner of the banned Joint Venture shall only be allowed to participate in the bidding process if its participation share is less than 35%.

In case the information/documents submitted by Agency in competing for the tender found to be false/forged then NHPC, without prejudice to any other rights or remedies it may possess, shall recover from Agency the cost incurred in carrying out physical assessment for establishing veracity of such information/documents. In case Agency refuses to reimburse such cost to NHPC then banning period of Agency shall be extended by another one year.

7.7 Effect of Banning

As far as possible, the existing ongoing contract(s) with the Agency may continue unless the Competent Authority, having regard to the circumstances of the case, decides otherwise, keeping in view contractual and legal issues which may arise thereof. In case the existing Contracts are allowed to continue, the suspension/Banning of Business Dealing along with default of the Contractor shall be recorded in the experience certificate issued for the work.

The Agency, (after issue of the order of banning of business dealings)would not be allowed to participate in any future tender enquiry and if the Agency has already participated in tender process as stand-alone OR constituent of joint venture and the price bids are not opened, his techno-commercial bid will be rejected and price bid will be returned unopened. However, where the price bids of Agency have been opened prior to order of banning, bids of Agency shall not be rejected and tendering process shall be continued unless Competent Authority having regard to the circumstances of the case decides otherwise keeping in view the Contractual, Legal issues which may arise thereafter. However, in case the suspension /Banning is due to default of an Agency for the provisions under Integrity Pact and the Agency happens to be Lowest Bidder (L1), the tendering process shall be annulled and fresh tenders shall be invited.

During the Suspension/ Banning period, if it is found at any stage that Agency has participated in tender enquiry under a different name then such Agency would immediately be debarred from the tender/contract and its Bid Security / EMD /Performance Security would be forfeited. Payment, if any, made shall also be recovered.

After Suspension/ Banning order, the Suspended/ Banned Agency shall not be allowed to participate as Sub-Vendor/Sub-Contractor in the tenders.

Further, if the Suspended/ Banned agency is an approved Sub-Vendor under any Contract for such equipment/component/service, the Main Contractor shall not be permitted to place work order/Purchase order/Contract on the Suspended/ Banned agency as a Sub-Vendor /Sub-Contractor after the date of Suspension/ Banning even though the name of the party has been approved as a Sub-Vendor /Sub-Contractor earlier.

There would be no bar on procuring the spares and awarding Contracts towards Annual Maintenance (AMC)/ O&M/ Repair works on Agencies pertaining to the packages for which they have been banned provided the Equipment has been supplied by such Agency.

Banning of business dealing shall not be applicable to the Subsidiary Company of the Banned agency provided subsidiary company has not participated on the strength of the Banned agency. However, in case of a default by a Sub-Contractor, the banning shall be applicable to the Sub-Contractor as well as the Lead Partner of the concerned JV or the Sole bidder as the case may be.

7.8 Hosting at NHPC website

The concerned unit shall forward the name and details of the Agency (ies) banned along with period and reasons of banning to IT&C Division of Corporate Office for displaying the same on the NHPC website.

8.0 Appeal against the Decision of the Competent Authority.

The Agency may file an appeal against the order of the Competent Authority banning of business dealing before Appellate Authority. Such an appeal shall be preferred within 30 (Thirty) Days from the date of receipt of the order of banning of business dealing. Appellate Authority would consider the appeal if convinced may constitute another committee for further investigation. The investigation Committee constituted by the Appellate Authority shall study the Report of the previous investigating committee and reply submitted by the Agency while filing its case for appeal and call the Agency for personal hearing, if requested by the Agency. Based on the recommendation of the committee Appellate Authority shall pass appropriate Speaking (Reasoned) order in line with Sub-Para 7.5 above which shall be communicated to the Agency as well as the Competent Authority (as per format enclosed as **Appendix-IV** with these guidelines).

9.0 Circulation of the names of Agencies with whom Business Dealings have been banned

The name of the concerned banned agency shall also be shared with MOP and other PSU in the sector and all the units of NHPC.

The provisions of this policy supersede and will have overriding effect on all earlier guidelines, procedures & system issued for the similar purpose.

****

Appendix –I

(Format for Intimation of Suspension of business dealing)

BY REGD. POST/SPEED POST/COURIER

No……. Date……

To

M/s ……

Attn.: Shri ……..

Sub: Intimation of Suspension of Business Dealings

Dear Sir,

Whereas the work of ……. was awarded to your firm vide letter of award no …dt….. amounting to Rs. ……. OR In response to NHPC NIT (e-tender / physical tender) no ……dt.you have submitted your bid . (strike out whichever is not applicable).
Whereas the conduct of your firm in respect of the following is under investigation:

Brief of the default

"Whereas the Competent Authority prima facie considered the allegations (under investigation) are of a serious nature and decided pending investigation, it is not in the interest of the corporation to continue business dealing with your firm

This order shall have the following effects:

i) Further business dealings with your firm is Suspended within Region/Project/Unit/wide NHPC. The order of Suspension is effective with immediate effect and would operate for a period of six months or till the investigation is completed and whole process of final order is over within such period. However, if investigations are not completed in six months' time, the Competent Authority may extend the period of Suspension

ii) During the period of Suspension, no business dealing shall be held with your firm. No enquiry / bid / tender shall be issued to your firm nor will the bids submitted by your firm be entertained.

iii) In cases where tenders have already been issued to you and price bids are yet to be opened, the Price Bid submitted by you shall not be opened and BG/EMD, if any, submitted by you shall be returned.

iv) In cases where tenders have already been issued to you and Price Bids have already been opened , the tendering process shall be continued

v) In case of ongoing contracts between you & NHPC, (including cases were contract has already been awarded before the issue of Suspension order) you will be required to continue with the execution and perform as per terms of the contract.

vi) a) In case the Firm is in Joint Venture the following would also be applicable:

i) **Participation of Agency in Joint Venture**

Tenders in which your firm has been proposed as Joint Venture Partner by any of the bidders and price bids have been opened prior to Suspension of your firm in such cases the tendering process shall not be annulled on this ground and the Agency shall be permitted to continue as Partner in the Joint Venture for such bidding. However where event of Price Bid opening has not

taken place prior to Suspension/Banning of Agency then in such case Agency shall not be permitted to participate as Partner in the Joint Venture.

ii) **Banning of joint Venture:**

As the Joint Venture is Banned, your firm intends to bid as Partner(s) of Joint Venture in bidding process then it shall be permitted to participate in the bidding process if it has not been Banned on grounds of its role and responsibility in the tendering process for which the Joint Venture has been Banned in Past. In case if the Joint Venture which has been Banned does not indicate the roles and responsibility of individual Partner(s) then, the partner of the Banned Joint Venture shall only be allowed to participate in the bidding process if its participation share is less than 35%.

b) Your firm shall not be allowed to participate as Sub-Vendor/Sub-Contractor in the tenders.

Further if your firm is an approved Sub-vendor under any Contract for such equipment/component/service, the Main Contractor shall not be permitted to place work order/Purchase order/Contract on your agency as a Sub-Vendor/Sub-Contractor after the date of Suspension/ Banning even though the name of the party has been approved as a Sub-Vendor/Sub-Contractor earlier.

c) There would be no bar on procuring the spares and awarding Contracts towards Annual Maintenance (AMC)/ O&M/ Repair works on Agencies pertaining to the packages for which they have been Banned provided the Equipment has been supplied by such Agency.

d) Banning of business dealing shall not be applicable to the Subsidiary company of the Banned agency provided subsidiary company has not participated on the strength of the Banned agency.

On expiry of the above period of Suspension/Banning, you may approach…… (Indicate the concerned procurement department), with request for revocation of the order mentioning inter-alia the steps taken by you to avoid recurrence of misconduct which has led to Suspension.

Yours faithfully,

For & On behalf of NHPC

Note: *Strike out whichever is not applicable*

Appendix –II

(Format of Show Cause Notice)

BY REGD. POST/SPEED POST/COURIER

No……. Date…….

To

M/s ……

……..……

Attn.: Shri ……..

Sub: Show Cause Notice

Ref :

Dear Sir,

You are hereby required to Show Cause in writing within 15 days from the date hereof why Business Dealing with your firm should not be banned / your firm is placed in the Banning List (as the case may be) and be debarred from entering into any contracts with NHPC for the following reasons:

(Give Reasons)

Your reply (if any) should be supported by documents and documentary evidence which you wish to rely in support of your reply. In case you desire to present your case in person to NHPC, a personal hearing shall be conducted on _____ at _____ Hours for which prior intimation be furnished to this office. Should you fail to reply to this Show Cause Notice within the time and manner aforesaid, it will be presumed that you have nothing to say and we shall proceed accordingly.

Your reply, if any, and the documents / documentary evidence given in support shall be taken into consideration prior to arriving at a decision.

Yours faithfully,

For & On behalf of NHPC

Appendix –III

(Format for Intimation of Banning of Business Dealing)

BY REGD. POST/SPEED POST/COURIER

No……. Date……

To

M/s ……

Attn.: Shri ……..

Sub: Intimation of Banning of Business Dealings

Dear Sir,

Whereas the work of ……. was awarded to your firm vide letter of award no …dtd….. amounting to ` ……. OR In response to NHPC NIT (e-tender / physical tender) no ……dt.you have submitted your bid .(strike whichever is not applicable)

Whereas the Competent Authority had prima facie considered the allegations as detailed below are of a serious nature and decided to conduct investigation.

"Brief of the Default may be mentioned"

Whereas show cause notice vide no … dtd…..was served upon you. (whereas in spite of the opportunity given to you, you failed to submit the reply to the show cause notice within the time period mentioned there upon or further extended period, if any). Whereas you submitted the reply along with documents vide your letter no. _____dt. _____ and presented your case in the personal hearing dated ..... (if any). After considering the allegations made in the show cause notice, your reply to the show cause notice documents/documentary evidence in support thereof and personal hearing dated _____ (if any) , it has been decided to Ban the Business Dealing with you and you are hereby debarred from entering into contracts with NHPC.

(In order to make the Intimation of Banning of Business Dealing Speaking Order (reasoned order), the issue of a Show Cause Notice and consideration of representation in reply to show cause notice, opportunity of personal hearing, if any, shall be communicated to the Agency concerned along with a reasoned order. The order for Banning should also contain the reasons with detailed justification for conclusion of decision to Ban the Agency. Also the fact that if no reply to the Show Cause Notice was received or request for personal hearing was not made shall invariably be indicated in the communication to the Agency. The above order shall mention the grounds considering violation of any provision of Integrity Pact, any ground mentioned in Guidelines of Banning of Business Dealings, default by the agency under fraudulent practice/ or any unethical practice and/ or violation of any provision of Tender/ Contract Condition having serious implications.)

This order shall have the following effects:

i) Further business dealings with your firm is banned with immediate effect. The order of Banning would operate for a period of _____years/month Competent Authority may extend the period of Banning.

ii) During the period of Banning, no Business Dealing shall be held with your firm. No Enquiry/ Bid/ Tender shall be issued to your firm nor will the bids submitted by your firm be entertained.

iii) In cases where tenders have already been issued to you and Price Bids are yet to be opened, the Price Bid submitted by you shall not be opened and BG/EMD, if any, submitted by you shall be returned.

iv) In cases where tenders have already been issued to you and price bids have already been opened, the Tendering Process shall be continued.

v) In case of ongoing contracts between you & NHPC, (including cases where contract has already been awarded before the issue of Banning order) you will be required to continue with the execution and perform as per terms of the contract.

vi) a) In case the Firm is in Joint Venture the following would also be applicable:

i) **Participation of Agency in Joint Venture:**

Tenders in which your firm has been proposed as Joint Venture Partner by any of the bidders and price bids have been opened prior to Banning of your firm in such cases the tendering process shall not be annulled on this ground and the Agency shall be permitted to continue as Partner in the Joint Venture for such bidding. However where event of price bid opening has not taken place prior to Banning of Agency then in such case Agency shall not be permitted to participate as Partner in the Joint Venture.

ii) **Banning of joint Venture:**

As the Joint Venture is banned, your firm intends to bid as Partner(s) of Joint Venture in bidding process then it shall be permitted to participate in the bidding process if it has not been banned on grounds of its role and responsibility in the tendering process for which the Joint Venture has been banned in Past. In case if the Joint Venture which has been banned does not indicate the roles and responsibility of individual Partner(s) then, the partner of the banned Joint Venture shall only be allowed to participate in the bidding process if its participation share is less than 35%.

b) Your firm shall not be allowed to participate as Sub-Vendor/Sub-Contractor in the tenders.

Further if your firm is an approved Sub-vendor under any Contract for such equipment/ component/ service, the Main Contractor shall not be permitted to place work Order/Purchase Order/Contract on your agency as a Sub-Vendor/Sub-Contractor after the date of Banning even though the name of the party has been approved as a Sub-Vendor/Sub-Contractor earlier.

c) There would be no bar on procuring the spares and awarding Contracts towards Annual Maintenance (AMC)/ O&M/ Repair works on Agencies pertaining to the packages for which they have been banned provided the Equipment has been supplied by such Agency.

d) Banning of Business Dealing shall not be applicable to the Subsidiary company of the Banned Agency provided subsidiary company has not participated on the strength of the Banned Agency. However, in case of a default by a Sub-Contractor, the banning shall be applicable to the Sub-Contractor as well as the Lead Partner of the concerned JV or the Sole bidder as the case may be.

On expiry of the above period of Banning, you may approach_____ (Indicate the concerned

procurement department), with request for revocation of the order mentioning inter-alia the steps taken by you to avoid recurrence of misconduct which has led to Banning.

Further if you desire to appeal against this order you may do so within 30 days from the date of issue of this order to the appellate authority as here under:

Appellate Authority:

Designation:

Address:

Ph. no.

e-mail:

Yours faithfully,

For & On behalf of NHPC

Note: *Strikeout whichever is not applicable*

Appendix –IV

(Format for communication of Appellate Decision on Suspension/Banning Order)

BY REGD. POST/SPEED POST/COURIER

No……. Date……

To

M/s ……

Attn.: Shri ……..

Sub: Suspension / Banning of Business Dealings - Intimation of decision of Appellate Authority

Ref: 1. Order dated …….. Placing M/s …… on Suspension/Banning List by NHPC;

2. Your Appeal reference ……. Dt…….

Dear Sir,

This has reference to the order dt…… placing you on Suspension/Banning List and your appeal petition reference ….. dt…. on the same.

After considering the findings of the Original Authority in order and submissions made by you in your appeal , and the documents/documentary evidences available on record, it has been decided finally that:

* There is no infirmity in the order of the Original Authority, and the allegations stand substantiated and the Suspension/ Banning for the period of …… years/month from the date of order, as ordered by the original Authority is upheld,
* Considering your submissions, the order of Suspension/Banning passed by the original authority is upheld, but with a reduction in period of Suspension/Banning for …… years/months from the date of order of original authority;
* Considering your submissions and the evidence available on record, there is enough justification to annul the order of the original authority.

*(*** Incorporate any one of the above as applicable)*

In order to make the Communication of Appellate Authority on Banning of Business Dealing Speaking Order (reasoned order), the fact that the representation of the agency has been considered and reference of grounds brought forward by the Agency in his defence and if any opportunity of personal hearing has been given to the Agency as a part of principle of natural justice shall invariably be mentioned in the communication. The order for Banning should also contain the reasons with detailed justification for conclusion of decision to Ban the Agency. Also the fact that if no sufficient ground has been furnished shall invariably be indicated in the final communication to the Agency. In case the option for Banning of Agency or reduction of Time Period for Banning of Agency is exercised then the above order shall mention the grounds considering violation of any provision of Integrity Pact, any ground mentioned in Guidelines of Banning of Business Dealings, default by the agency under fraudulent or any unethical practices and/or violation of any provision of Tender/Contract Condition having serious implications.

Yours faithfully,

For & On behalf of NHPC

SECTION - IV

SCOPE OF WORK
&
DETAILED TECHNICAL SPECIFICATIONS

1. 11 kV Switchgear, Vacuum Circuit breakers (VCB) with Panel and accessories

1.1. Scope of Supply and Work

Supplier's Scope

Scope of supply and work covers supply, erection, integration with existing 11KV Bus, testing & commissioning of 4 nos., 11kV, 3-Ph., 50Hz, 400A, 25kA, Vacuum Circuit Breaker with Panel and dismantling of existing 11 KV panels with Circuit Breakers. It also covers the provision of labour, tools, plants, materials and performance of work necessary for the design, engineering, manufacture, quality assurance, quality control, shop assembly, factory acceptance testing, packing, transportation, delivery at site, installation, commissioning, performance and acceptance testing at site and guarantee for satisfactory operation of the system.

The scope of work shall be a comprehensive functional system covering all supply and services including but not limited to following:

i) 11 KV VCB with panel including protection, metering, bus-bar system, cabling, wiring and other accessories, and comprising of following major equipment

- 11 kV Vacuum circuit breaker,
- Current transformers, Potential transformers,
- Energy meters (trivector type for metering purposes) and MFM meters
- Numerical protection relay (Only for 1 Panel). In remaining four panels existing numerical relays (GE P40 Agile, P141) available at site shall be integrated. For that provision must be kept in the newly supplied panels. Provision must also be made for entry of SCADA system cables in the newly supplied panels.
- Adapter Panel for integration with existing 11KV Bus. It should have provision for integration of more 11KV panels in the future.
- Insulating Mats in front and back of the panel
- Heat shrinkable cable termination kits for HT cables
- Indicating lamps, annunciator panel, hooter etc
- Cautionary and Warning signs (to be displayed in Hindi and English)

ii) All necessary auxiliaries for control and supervisory circuits, local control switches and other relays as required,

iii) All secondary wiring, terminal blocks, labelling and nameplates, sockets etc.

iv) Cubicle lighting including lighting fixtures and power and communication sockets,

v) Cubicles heating including heating elements,

vi) Accessories like Racking handle, manual open/close handle etc for each breaker.

vii) Coordination and provision of necessary contacts and/or ports for integration with plant SCADA system.

viii) Dismantling of existing 11 KV panels and their disengagement from existing 11KV Bus.

ix) Erection, testing and commissioning of the newly supplied 11 KV panels and their integration with existing 11KV Bus .

x) One set of spare parts as per Clause 1.8

xi) ***Special Tools as per Cl 1.10***

xii) Other items hardware required to complete the work and successful operation of the panels

NHPC's Scope

i) Loading and Unloading of material at site.

ii) HT Power cable shall be provided by NHPC. However it's termination(alongwith cable termination kit) in newly supplied panels shall be in supplier's scope.

1.2. Specific Parameters and Layout Conditions

1.2.1. Layout and General Arrangement

The 11 KV switchgear shall be suitable for indoor installation. Switchgear shall be installed at Switchyard Complex of Chamera Power Station-I at EL 592.2 Meter (approx.), with atmospheric temperature variation between (-) 5°C to (+) 50°C. Materials for different components shall be suitably selected to remain undistorted under the wide variation of atmospheric temperature.

Out of four 11 KV panels two are incoming panels, one bus-tie panel and one outgoing panel. These four panels shall be installed together and integrated with existing 11KV Bus.

Provision for cable entry/exit shall be made in panel back side bottom. Incoming and outgoing of 11KV Switchgear shall be protected for instantaneous and time delay over current and earth fault. One of the incomer panel shall have provisions for Bucholz , OTI and WTI trip also.

Minor civil work required, if any for the installation of the equipments shall be carried out by the Contractor.

1.3. Rating and Functional Characteristics

Capacity ratings specified in this section are minimum values to be achieved at the project. The contractor has to incorporate necessary correction on account of altitude and temperature considerations in the design of the equipment.

1.3.1. Rating

Sl. No.	System Description	Requirements
1	Location	Indoor
2	Number of poles	3
3	Type of earthing	Solidly earthed
4	Rated system voltage, kV, r.m.s	11
5	Highest system voltage, kV, r.m.s	12
6	Rated frequency, Hz	50
7	Rated withstand Voltage to earth Power Frequency Lightening Impulse (peak value)	 28 kV 75 kV
8	Rated short time withstand current (rms) for 1 Sec	25 kA
9	Rated Peak withstand current	62.5 kA
10	Rated normal current, A	400
11	Bus bar material	Copper
12	Cable Entry/Exit	Back side Bottom
14	Enclosure protection	As per IS/IEC 60529
15	Control voltage DC	220V ±10%
16	Auxiliary AC supply, 1 phase	230VAC ±10%

17	**Circuit Breaker**	
i	Type	Vacuum
ii	Description	Three phase equipped with group control mechanism
iii	No. of interrupter unit per pole	1
iv	First-pole-to clear factor	1.5
v	Rated short circuit breaking capacity, kA (rms)	25 kA
vi	Rated short circuit making capacity, kA (peak)	62.5 kA
vii	Rated cable charging breaking current, A (rms)	25 A
viii	Rated operating sequence	O-0.3S-CO-3min-CO
ix	Normal voltage for operating mechanism i.e., charging motor (DC)	220 V DC ±10%
18	**Current Transformer**	
i	Current Ratio	400-200/5
ii	Burden	15 VA
iii	Accuracy class	
	E/F and O/C protection	5P20
	Metering	0.2s
19	**Potential Transformer**	
i	Transformation ratio	11kV/√3/110V/√3
ii	Burden	50 VA or as per design requirements
iii	Accuracy Class	
	Relaying	3P
	Metering	0.2s
iv	Rated voltage factor	1.2 times continuous
20	Energy Meters	
	Type	Trivector meter
	Accuracy Class	0.2s or better
21	Protection relays	Numerical based, communicable on IEC61850 with RJ-45 Port
22	Multi Function Meter	
	Accuracy Class	0.2 or better

Note:

1.) The switchgear should be type tested for internal arc for 1 sec

2.) Incoming and Outgoing 11KV Power cables shall be provided by NHPC. However there termination in new 11KV Panels shall be in supplier's scope

1.3.2. Current ratings and short circuit capabilities

The 11 kV panels shall be designed to be capable of withstanding without damage all stresses by maximum symmetrical short circuit (peak) currents in the bus bar and in the incoming and outgoing bays.

The complete design and layout shall be subject to approval by the Employer.

1.4. Performance Guarantee

The 11 KV switchgear along with all auxiliaries and accessories shall be capable of performing intended duties under specified conditions. The Contractor shall guarantee the reliability and performance of the individual equipment as well as of the complete system.

1.5. Design and Construction

1.5.1. Standards

The system and equipment shall be designed, built, tested and installed to the latest revisions of the following applicable standards. In the event of other standards being applicable they will be compared for specific requirement and specifically approved during detailed engineering for the purpose:

Standards	Description
IS 2705	Instrument transformers - Part 1,2 & 3 : Current transformers
IS 3156	Instrument transformers- Part 1,2 & 3 : Voltage transformers
IEC 62271-100	High-voltage switchgear and controlgear - Part 100: High-voltage alternating-current circuit-breakers
IS/IEC 62271-200	High-voltage switchgear and controlgear - Part 200: A.C. metal-enclosed switchgear and controlgear for rated voltages above 1 kV and up to and including 52 kV
IS/IEC 62271-1	High-voltage switchgear and controlgear - Part 1: High-voltage alternating-current circuit-breakers Common specifications (High-voltage switchgear and control gear)

1.5.2. General

The 11 kV Indoor Switchgear shall be of the steel enclosed type vermin proof, dust proof and shall comply with the requirements of latest edition of IEC/IS. The switchgear should be internally arc tested. The switchgear shall be complete with Vacuum circuit breakers, dry type instrument transformers, bus bars, earthing arrangements, instruments and protective relays, labels, cable end boxes, glands, all necessary wiring and auxiliary devices required to perform its functions.

Bus bars, cable end boxes, potential transformers and breaker orifices shall be provided with independently operated automatic shutters to avoid accidental contact with live parts.

The cold rolled sheet of the panel shall not be less than 2.5 mm thick. Whereas doors, covers and partition shall be minimum 2.0 mm thick. One end section of panel shall be provided with blank plates with provisions to facilitate further bus bar extension on either side. All doors, panels, removable covers shall be gasketted all around with neoprene gaskets. If necessary, openings for natural ventilation shall be provided.

The panel shall be provided with removable gland plate of 2.5 mm thick of ample size for the cable and shall be positioned to give adequate ground clearance to facilitate cable termination. The panel shall be supplied complete with supports for clamping incoming/outgoing cables. Cable entry shall be from the back side bottom.

A set of insulating shutters shall be provided to cover stationary isolating contacts. The shutters shall open automatically by a positive drive initiated by the movement of the Circuit Breaker.

Black engraved Perspex sheet or PVC of 3 mm thick nameplate with the switchgear designation shall be provided. Name plates shall be provided for each component. (Lamps, PBs, Switches, Relays, and Auxiliary contactors) mounted on the switchboard. Special warning plates shall be provided at the back of the vertical panel. Terminal blocks shall be grouped according to circuit functions and shall have at least 20% spare terminals.

All shutters and doors shall be effectively earthed. The panel shall be provided with two earthing stud terminals with suitable nuts, washers etc. for connection to earth bus.

To represent the single line diagram, a mimic diagram shall also be made available on the panel.

The circuit breaker cubicle shall be provided with space heater controlled by a suitable switch and thermostat and door operated illumination lamp.

1.5.2.1. *Bus bars*

All bus bars shall be provided with phase colour identification in a prominent position. Bus bars shall be of Copper with uniform cross sectional area throughout their length, with connections as short and straight as possible.

Bus bars and all other electrical connection between various components shall be made of electrolytic copper of rectangular / tubular cross sections as per the type tested and ratified design. The bus bars section should have ample capacity to carry the rated current of minimum 800 Amps in panel at an ambient temperature of 40 deg C, continuously without excessive heating and for adequately meeting the thermal and dynamic stresses in the case of short circuit in the system up to full STC rating of 25kA for 1 sec.

All bus bars connections shall be firmly and rigidly mounted on suitable insulators to withstand short circuit stresses and vibrations.
All fasteners (Nuts Bolts) used for bus bar connections shall be of nonmagnetic stainless steel. If the fasteners used are not of stainless steel the bidder shall state in their offer the material used and confirm that the same is non-magnetic and is superior to stainless steel.

Adequate clearance between 11 kV point and earth and between phases to ensure safety as per provision in Indian Electricity Rule 2003 and its amendment thereof and also in accordance with the relevant Indian standard specification and the same shall be capable of withstanding the specified high voltage tests as per IS 13118 and amendment thereof.
Sharp edges and bends either in the bus bars or bus bar connections shall be avoided as far as possible. Wherever such bends or edges are un-avoidable, suitable compound or any other insulation shall be supplied to prevent local ionization and consequent flashover.

The bus bars along with their supporting insulators etc. shall have a short time current rating of 25 KA for 1 sec. Test certificate of bus bar for rated STC rating shall be submitted, along with the bid. These insulators shall be of solid core porcelain or epoxy resin cast with suitable design. Insulators shall have suitable cantilever strength.

All the bus bars within the switchgear assembly shall be air insulated group enclosed and shall have suitable rated current capacity. Bus bars shall have mechanical and thermal capacity of not less than that represented by the short time current rating of circuit breakers.

1.5.2.2. *Circuit breaker*

The 11 kV circuit breakers shall be vertically mounted, horizontal draw out type of latest generation of Vacuum breaker, electrically trip free, with anti pumping device and operated by means of motor charged, stored energy type spring mechanism.

Motor operating mechanism shall have provision for closing/opening of breaker manually and an interlock shall be provided between electrical and manually operating modes for

either electrical or manual operation. Circuit breaker shall be according to IEC/IS and shall be complete with the proper interlocking. Circuit breaker should be able to open or close in service position with door open.

The Circuit Breaker shall be provided with a visual, mechanised, indicating device for `Open' and `Closed' position, and spring charged indication of the breaker. These shall be visible from the front without opening the panel door. Also there shall be provision for mechanical (manual) tripping and also for manual charging of the springs.

The Circuit Breaker shall be provided suitable number of NO + NC auxiliary contacts as spare in addition to the other functional requirements and wired up to the metering compartment/final terminal strip, suitable for inter panel wiring and outgoing field/control panel cabling.

The breakers shall be capable of making and breaking the short time current in accordance with the requirement of IS 13118 (1991) and latest amendment thereof and shall have three phase rupturing capacity of 25KA for 1 second at 11 KV. The continuous current rating of all current carrying parts of breaker shall be minimum 400 Amps for all items. The total break/make time shall be not more than 4 cycles for break and 6 cycles for make time for all breakers.

The spring release coil for VCB close and VCB trip coil shall both be rated for Continuous energization at the rated close / trip voltage. Trip and close coil shall be suitable for 220 V DC.

The vacuum circuit breakers shall ensure high speed extinction and adequate control of pressure during breaking of current and also designed to limit excessive over voltages. Comprehensive interlocking system to prevent any dangerous or inadvertent operation shall be provided. Isolation of circuit breaker from bus bar or insertion into bus bar shall only be possible when the breaker is in the open position.

Vacuum Circuit Breaker shall have completely sealed interrupting units for Interruption of arc inside the vacuum.

The circuit breaker shall be provided with motor for spring charging operation. Spring charging motor shall be suitable for 230V, 50 Hz, single phase AC and 220 V DC Supply. Suitable rating starter/fuse shall be provided for Motor protection. Provision shall be available for charging the springs manually as well, and to close CB mechanically.

1.5.2.3. *Current transformer*

The current transformer shall be of inductive type. It shall be mounted within the cubicles and shall comply with the requirements of relevant IEC/IS. It shall be used for protection and metering. Current transformers shall be dimensioned to carry continuously a current of 120% of the rated current.

The rated secondary winding current shall be 5A. The polarity of the CTs shall be clearly marked. The current transformer shall be capable of safely withstanding the short circuit stresses corresponding to breaker rating.

1.5.2.4. *Potential transformer*

The potential transformer shall be of inductive type. It shall be mounted within the cubicles and shall comply with the requirements of relevant IEC/IS.

The potential transformer at bus bar shall be of two cores used for metering and interlocks/ protection. The primary winding of the voltage transformer shall be protected by means of HRC fuses.

1.5.2.5. *Cable Termination kits*

*Cable Termination kits (1*120sqmm and 3*95sqmm) for 11KV HT cable indoor termination shall confirm to IS 13573-3. Type test report of the kit as per relevant IS/IEC shall be submitted by the firm.*

1.5.2.6. *Insulating Mats*

Insulating mats of class B of appropriate size confirming IS: 15652 shall be provided in front and back of all the 11 kV panels for the safety of personnel.

1.5.3. Control description

1.5.3.1. *General*

Vacuum circuit breaker shall be equipped with facilities for remote operation. Each Vacuum circuit breaker unit shall be equipped with a local start-stop push button/TnC switch and indicators showing the position of the breaker. The Vacuum circuit breaker shall be operable with the breaker in test position. Auxiliary contactors with an alarm contact for remote indication of tripped condition shall be provided for protection of control circuits. All circuit breaker shall be equipped with trip circuit supervision device.

Auxiliary contacts for at least the following remote indications of the circuit breakers shall be wired to terminal blocks:

- Main contact position, (Open, closed)
- Test, isolated and connected /service position,
- Trip condition,
- Protection relay contacts,
- Trip circuit supervision relays.

1.5.3.2. *Metering and protection*

All instruments and control switches mounted in the switchgear shall be in accordance with relevant standard.

The bus bar voltage metering shall contain potential transformer.

All metering circuits shall be terminated in terminal blocks for remote metering purposes.

1.5.3.3. *Interlocks*

The 11 kV breakers connecting incoming supply and outgoing supply shall be provided with suitable/necessary interlocks to avoid paralleling of supplies. In the four panels to be installed together, if incoming supply is available in the Busbar, then no other incomer or bus tie breaker shall close.

1.6. Drawings, Documents and Design Calculations

1.6.1. Drawings and documents

The Contractor shall furnish Three (3)) sets of O&M manuals in properly bound hard copy which shall include GA drawing , Power and Control Schematic, Wiring Diagrams, Foundation and Floor Cut-out details ,recommended operation and maintenance procedures, testing & installation guide lines. All instruction data etc. shall pertain only to the equipment supplied. The bidder shall also provide the soft copy of the manuals.

The bidder shall furnish catalogs / leaflets of the equipment offered along with the bid.

1.7. Dismantling, Installation and Commissioning

Dismantling of existing panels and their disengagement from existing 11KV Bus and erection, testing and commissioning of new panel alongwith their integration with existing 11KV Bus shall be in the scope of contractor. Modifications required in existing Busbar for the said work shall also be in the scope of contractor.

Tools and testing equipment required for dismantling, erection, testing and commissioning shall be arranged by the Contractor.

1.8. Spare Parts

Specified spare parts to be supplied under this section are as follows:

S. No.	Description	Quantity
1	Circuit Breaker with complete assembly	1 no
2	Circuit breaker trip and closing coils	4 nos. of each type
3	Bus insulator	3 nos. of each type
4	Indicating lamps with assembly of each type used	5 nos. of each used type
5	Auxiliary relays (Master trip)	4 nos. of each type
6	IDMT Relay	1 nos of each used type
7	Energy Meters (Trivector type)	4 nos. of each type
8	Current Transformers (single phase)	1 nos. of each type
9	Potential Transformers (single phase)	1 nos. of each type

1.9. AUXILIARY/CONTROL WIRING :

a) All the secondary wiring in the panel shall be 1100 volts grade single core, multi strand flexible tinned copper wires have high quality PVC insulation and the same shall have conductor size of not less than 2.5 mm2 of copper. Colours of the secondary/auxiliary wiring should confirm to IS 375/1963 and latest amendment thereof if any. All wiring shall be neatly run and group of wiring shall be securely fixed by clips so that wiring can be checked without necessity of removing the clamps. Wiring between fixed and moving portion of the panel shall be run in flexible tubes and the same shall be so mounted to avoid any damage to them due to mechanical movements. Ferrules with number shall be provided on both end of the wiring.

b) All front mounted as well as internally mounted items including MCBs shall be provided with individual identification labels. Labels shall be mounted directly below the respective equipment and shall clearly indicate the equipment designation.

c) Terminal blocks shall be of screw type design made out of insulating material of 1100 V grade. All terminals shall have all current carrying and live parts made of tinned plated brass. The washers, nuts, etc. used for terminal connectors shall also be of tinned plated brass.

d) At least 20% spare terminals shall be provided. All terminals shall be provided with ferrules indelibly marked or numbered and identification shall correspond to the designations on the relevant wiring diagrams. The terminals shall be rated for adequate capacity which shall not be less than 10 Amps for control circuit. For power circuit it shall not be less than 15 Amps.

e) All fuses used shall be of HRC type. The fuse base and carrier shall be plug-in type moulded case. All current carrying and live parts shall be of tinned/nickel plated copper.

g) Auxiliary supplies available at site are as follows:-
Rating: i) A. C. Supply 230 volts with ± 10% variation
ii) D.C. Supply 220 V DC with +10% to – 10% variation

1.10. Special Tools

i) ***2*** no***s***. Breaker Handling Trolley (required only if offered breaker not have wheels)

1.11. Quality Assurance and Testing

The Contractor shall follow the quality assurance and testing requirements specified separately in "Quality assurance Plan" (Annexure-I of Section-VI)

The contractor shall conduct the Routine and type tests as per relevant IS/IEC. Routine tests shall be conducted in the presence of NHPC inspector. The reports of all the tests conducted shall be provided to NHPC.

Commissioning Tests are to performed as per relevant IS/IEC.

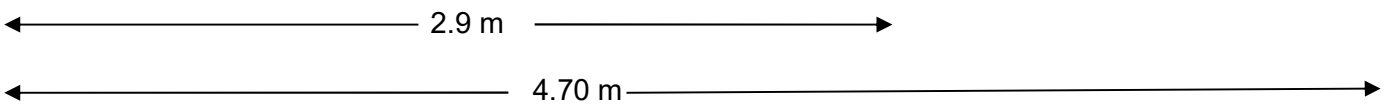
1.12. Dimensions at site

i) Maximum width of all the four panels (along with adapter panel) to be installed together and integrated with existing 11KV Bus should not be more than 2.9 metres.

DIMENSIONAL DETAILS

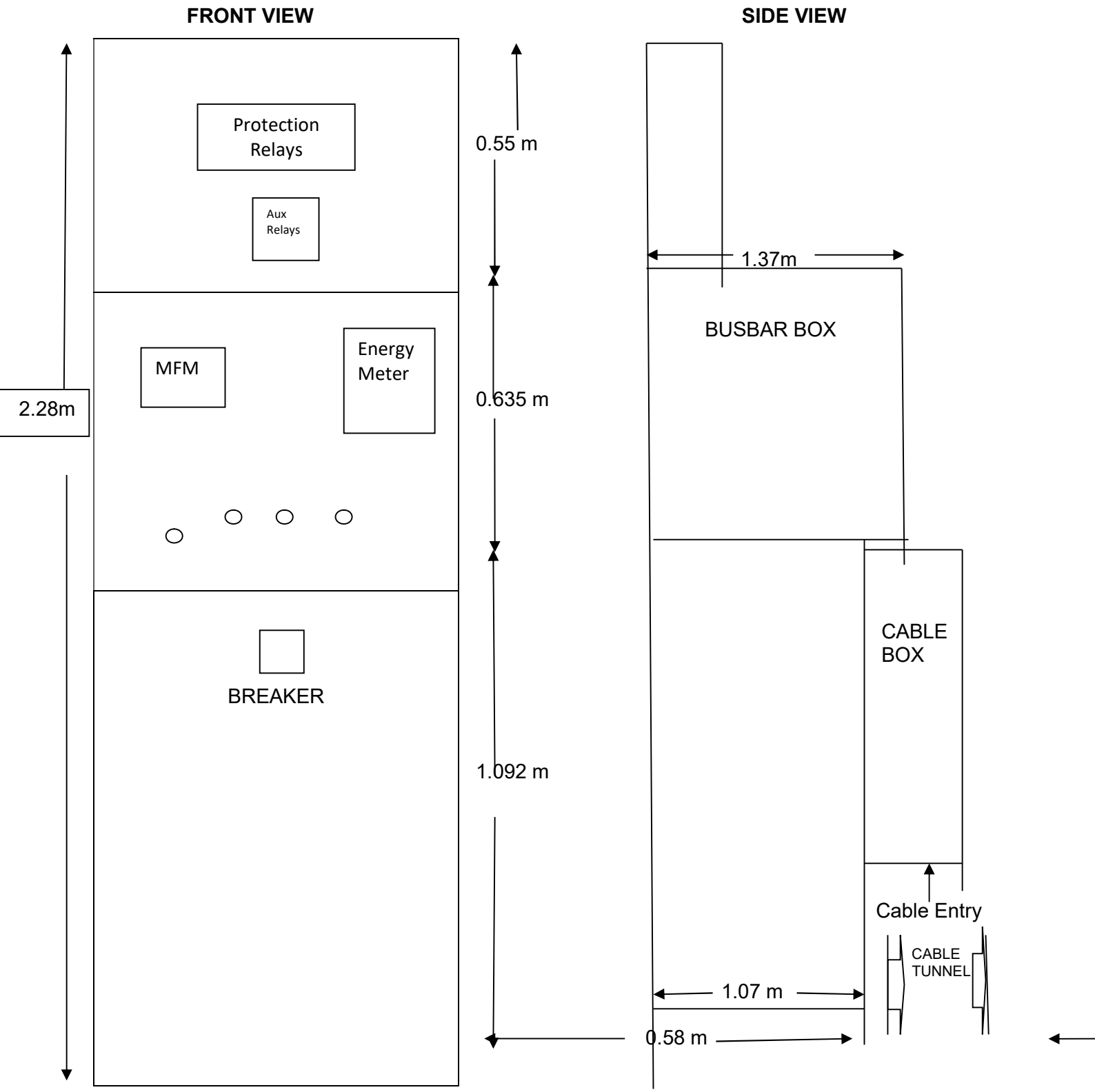
EXISTING 11KV BUS

Bus-Tie 1	Lower Samleu-I	5MVA Transformer Incomer	DG-2 Incomer	Spare	Khairi Feeder	TRT Feeder	Bus-Tie-2
(Bus Coupler)	(Outgoing Feeder)	(Incoming Feeder)	(Incoming Feeder)		(Outgoing Feeder)	(Outgoing Feeder)	(Bus Coupler)
To be Replaced	**To be Replaced**	**To be Replaced**	**To be Replaced**	**To be used for adapter Panel**	To be Retained	To be Retained	To be Retained



- Newly Supplied 4 Panels alongwith adapter panel has to be adjusted within the space marked by Red Panels
- Space available on side of the panel upto the start of cable trench is approx 1.23 m
- Width of Cable Trench is approx 0.76 m
- All Dimensions are subjected to measurement tolerances.

EXISTING INDIVIDUAL PANEL



Guaranteed Technical Particulars for 11KV Vacuum Circuit Breaker alongwith Panel and accessories

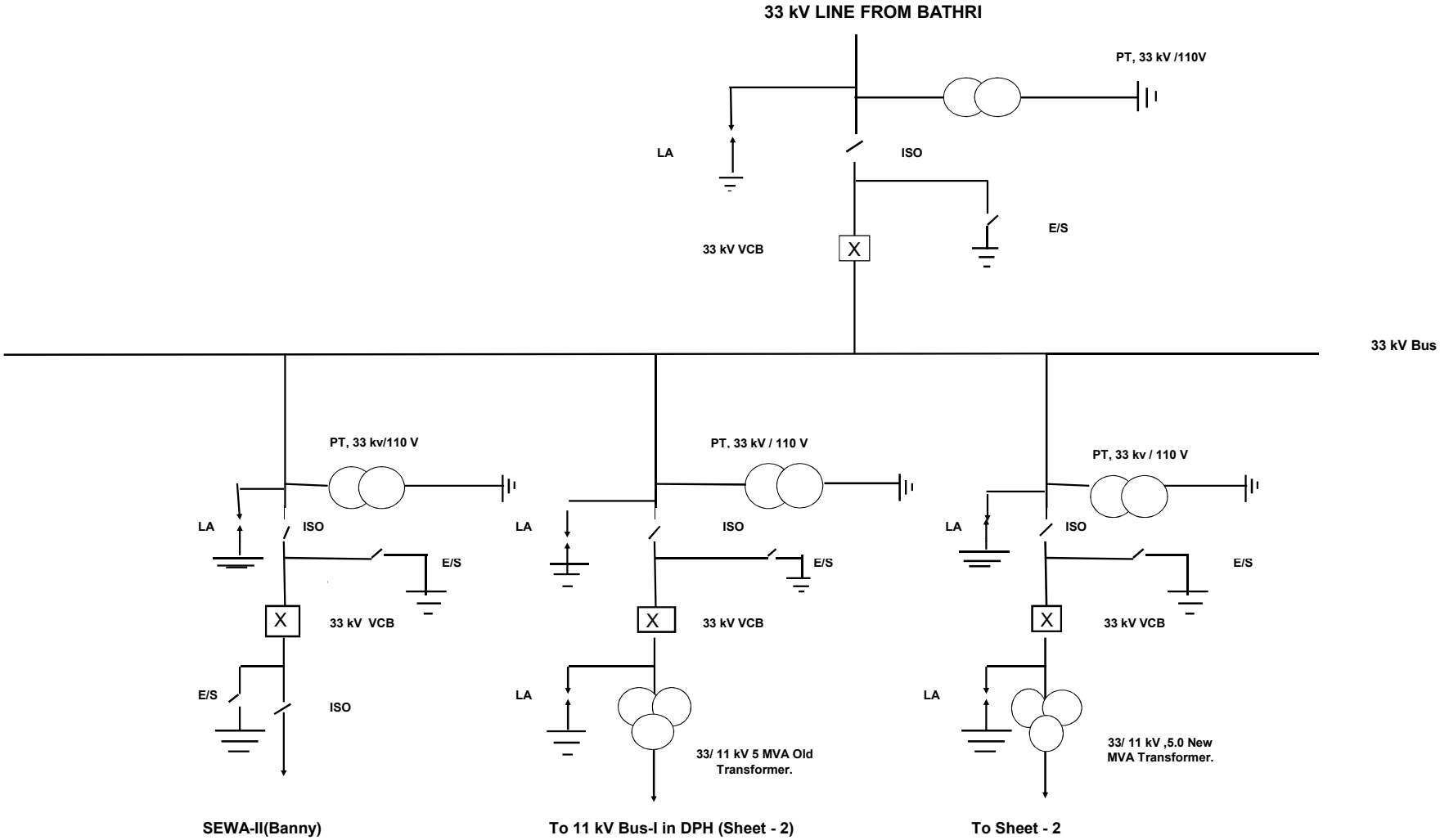
Sl. No.	System Description	Requirements	Bidder's confirmation
1	Location	Indoor	
2	Number of poles	3	
3	Type of earthing	Solidly earthed	
4	Rated system voltage, kV, r.m.s	11	
5	Highest system voltage, kV, r.m.s	12	
6	Rated frequency, Hz	50	
7	Rated withstand Voltage to earth Power Frequency Lightening Impulse (peak value)	 28 kV 75 kV	
8	Rated short time withstand current (rms) for 1 Sec	25 kA	
9	Rated Peak withstand current	62.5 kA	
10	Rated normal current, A	400	
11	Bus bar material	Copper	
12	Cable Entry/Exit	Back side Bottom	
14	Enclosure protection	As per IS/IEC 60529	
15	Control voltage DC	220V ±10%	
16	Auxiliary AC supply, 1 phase	230VAC ±10%	
17	Circuit Breaker		
x	Type	Vacuum	
xi	Description	Three phase equipped with group control mechanism	
xii	No. of interrupter unit per pole	1	
xiii	First-pole-to clear factor	1.5	
xiv	Rated short circuit breaking capacity, kA (rms)	25 kA	
xv	Rated short circuit making capacity, kA (peak)	62.5 kA	
xvi	Rated cable charging breaking current, A (rms)	25 A	
xvii	Rated operating sequence	O-0.3S-CO-3min-CO	
xviii	Normal voltage for operating mechanism i.e., charging motor (DC)	220 V DC ±10%	
18	Current Transformer		
iv	Current Ratio	400-200/5	
v	Burden	15 VA	
vi	Accuracy class		

Guaranteed Technical Particulars (GTP)

	E/F and O/C protection	5P20	
	Metering	0.2s	
19	Potential Transformer		
v	Transformation ratio	11kV/√3/110V/√3	
vi	Burden	50 VA or as per design requirements	
vii	Accuracy Class		
	Relaying	3P	
	Metering	0.2s	
viii	Rated voltage factor	1.2 times continuous	
20	Energy Meters		
	Type	Trivector meter	
	Accuracy Class	0.2s or better	
21	Protection relays	Numerical based, communicable on IEC61850 with RJ-45 Port	
22	Multi Function Meter		
	Accuracy Class	0.2 or better	

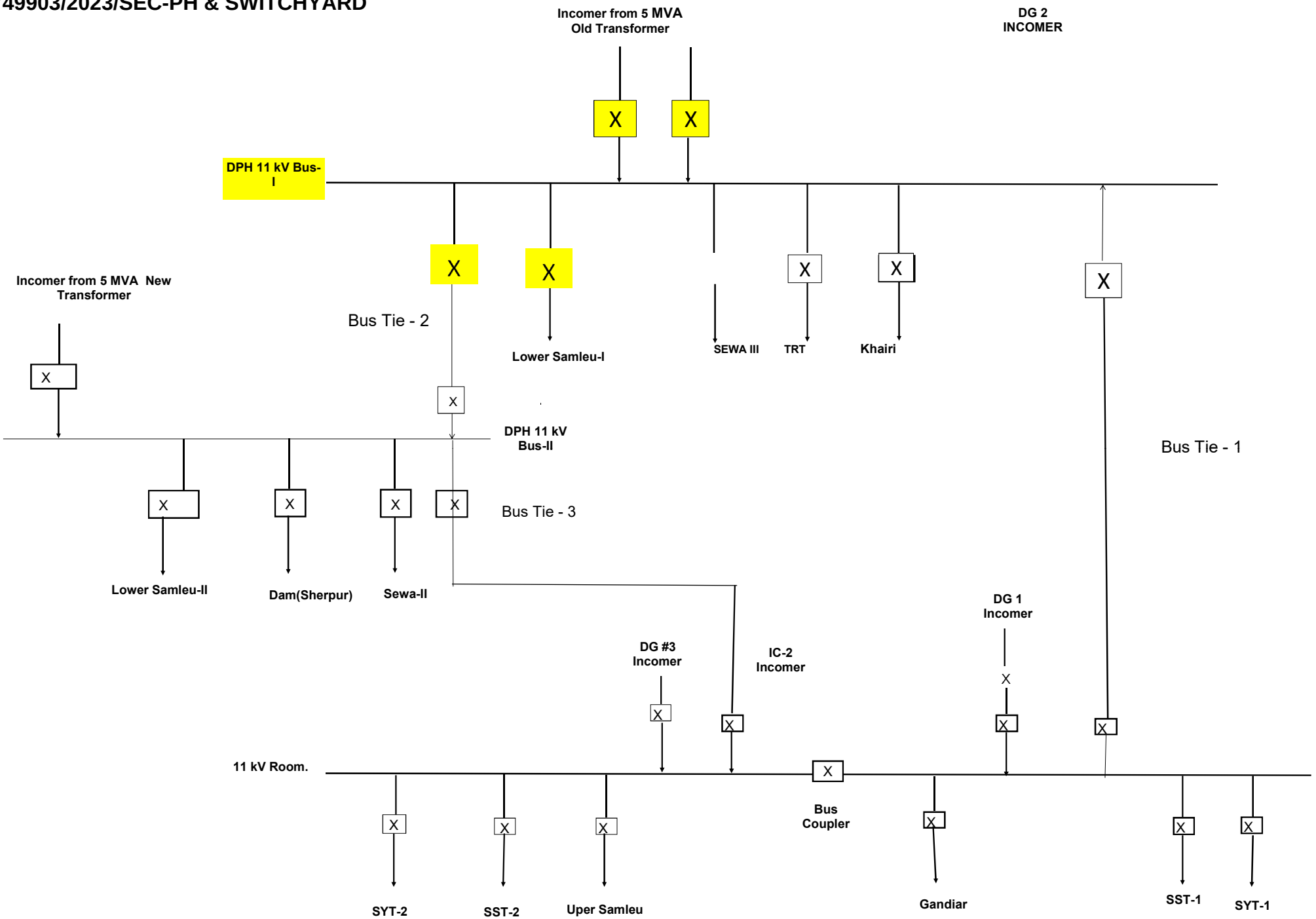
749903/2023/SEC-PH & SWITCHYARD

SHEET - 1



SHEET - 2

749903/2023/SEC-PH & SWITCHYARD



SECTION-V

SPECIAL CONDITIONS OF THE CONTRACT (SCC)

Special Condition of Contract

1) **TYPE TEST REPORTS:** Type Tests shall be conducted in a laboratory approved by Govt of India or accredited by National Accreditation body of India, like CPRI, IRDA etc. Test reports submitted shall not be more than 10 years old and shall be valid as on the last date of bid submission.

2) **PRICES & TAXES & DUTIES:** Prices shall be Firm and on F.O.R destination basis i.e. Project Site, Chamera Power Station-1, Khairi, Tehsil-Dalhousie, Distt.-Chamba, H.P., inclusive of charges for packing, handling, forwarding, transportation and all applicable taxes & duties.

3) **PAYMENT TERMS:** Payment shall be regularised as per milestone achievement.
   - 60% payment of supply value along with 100% tax of supply portion shall be released on receipt of material at Central Store and upon production of requisite documents as detailed below.
     a) Evidence of dispatch (LR etc.)
     b) Inspection report, Test Certificates (if any)
     c) Invoice along with detailed packing list
     d) Submission of performance guarantee and acceptance thereof
     e) Intimation of Transit Insurance
   - Balance 40% payment of supply value and 100% payment of Installation, Testing and Commissioning charges shall be released after successful completion of work at site and submission of invoice.
   - Payment shall be released through NEFT/RTGS (Electronic Clearing System) and Bank Charges, if any, shall be borne by the supplier.

4) COMPLETION TIME:
The completion time shall be as follows:

Sl. No.	Activity	Period	Remarks
1	Issue of LOA	Zero date	
2	Submission of drawing for approval	15 days	From zero date
3	Approval of drawing by NHPC	15 days	From the date of submission of drawing.
4	Delivery of items at site	50 days	From the date of approval of drawing
5	Dismantling, Installation, testing & Commissioning work	10 days	From the date of site availability notified by the NHPC

5) **DEFECT LIABILITY:** Any deficiency in workmanship shall be guaranteed / warranted for at least 12 months from the date of commissioning. Any defect/problem arising during defect liability period shall be rectified by the contractor within 07 days at no cost to NHPC.

6) **ACCOMMODATION:** Free accommodation shall be provided to the team deployed for installation work during the work period, subject to its availability.

7) **TRANSIT INSURANCE:** Material shall be insured under open transit insurance policy no**.** 36160021240200000001, Period of insurance Dated:03.04.2024 to 02.04.2025) of Chamera Power Station-I, NHPC Ltd with The New India Assurance Co. Ltd., Asst. Manager (Mkt) / Admin. Officer (D) - Divisional Office, Dalhousie Road, Distt - Pathankot. Photocopy of invoice and dispatch instruction should invariably be sent to the Insurance co. Through phone 0186-2221702/2224842, mob. No. +91-9888646546/+91-9814299703, through email-id v.sharma69@yahoo.com, s.chander@newindia.co.in
   It may please be ensured that the insurance company sends the confirmation/acknowledgement of declaration of goods insured under transit/dispatch by means of return fax or through auto generated reply emails.

8) **COMPLIANCE TO STATUTORY LAWS:** Contractor is required to adhere to all statutory laws and labour laws.

9) **SITE VISIT:** Contractor is advised to visit the site before start of work to get acquainted with site requirements.

10) **SAFETY IN WORK & INSURANCE COVERAGE:** Carrying out the work in safe and sound manner shall be the sole responsibility of the contractor. The contractor shall take care of all statutory guidelines in this regard as per NHPC safety guidelines/manual.

11) The firm shall execute the work strictly adhering to the government guidelines/instructions issued by Engineer-in-Charge.

SECTION-VI

QUALITY ASSURANCE PLAN (QAP)
&
SAFETY MANUAL

QUALITY ASSURANCE PLAN (QAP)

Annexure-I

गुणवत्ता आश्वासन योजना(QUALITY ASSURANCE PLAN) : (MODEL)

परियोजना (PROJECT) : CHAMERA POWER STATION-I, KHAIRI, DISTT C ग्राहक (CLIENT): एनएचपीसी लिमिटेड (NHPC LTD.)
VENDOR :
उपष्कर का नाम (NAME OF EQUIPMENT) : MV SWITCHGEAR NIT/P.O. REFERENCE :

क्रं. स. SR. NO.	मद/घटक ITEM /COMPONENT	जांच की प्रकृति NATURE OF CHECKS	जांच की मात्रा QUANTUM OF CHECKS	संदर्भ दस्तावेज़/स्वीकृति मानदंड REFERENCE ACCEPTANCE DOCUMENTS NORMS	रेकॉर्ड प्रारूप RECORD FORMAT	INSP. AGENCY			टिप्पणी REMARKS
						प्रदर्शन Perform	गवाह Witness	सत्यापन Verify	
A	**Raw Material**								
1	**Steel Sheet**								
a)	Material Testing	Mech./Chem.	Sample plan	Tech.Spec./ Approved drg.	TC	2/3	-	1	TC
b)	Dimensional Check	Measurement	-do-	-do-	TC	2/3	-	1	TC
2	**Bus-Bar (Copper)**								
a)	Dimensional Check	Measurement	100%	Tech.Spec./ Approved drg.	TC	2/3	-	1	TC
b)	Conductivity	Electrical	Sample plan	-do-	TC	2/3	-	1	TC
c)	Hardness (for terminals)	Mechanical	-do-	-do-	TC	2/3	-	1	TC
d)	UTS, % Elongation	-do-	-do-	-do-	TC	2/3	-	1	TC
3	**FRP Sheets**								
a)	Dimensional Check	Measurement	Sample plan	Tech.Spec./ Approved drg.	TC	2/3	-	1	TC
b)	Dielectric Test	Electrical	-do-	-do-	TC	2/3	-	1	TC
c)	Hygroscopic Test	Chemical	-do-	-do-	TC	2/3	-	1	TC
d)	Fire Retardant Test	Thermal	-do-	-do-	TC	2/3	-	1	TC
4	**Gaskets**								
a)	Mechanical Properties	Mechanical	Sample plan	Tech.Spec./ Approved drg.	TC	2/3	-	1	TC
5	**Protective Relays (O/C & E/F, Under Voltage etc)**								
a)	Make, Type & Rating	Visual	Sample plan	Tech.Spec./ Approved drg.	TC	2/3	-	1	TC
b)	Operational Test	Electrical	-do-	-do-	TC	2/3	-	1	TC
c)	High Voltage Test	-do-	-do-	-do-	TC	2/3	-	1	TC

Note: a. In 'Inspection Agency'column figure 1,2,or 3 to be filled. 1- will indicate 'Chamera Power Station-I, NHPC Ltd. ', 2/3- will indicate 'supplier' / 'sub-supplier'
b. In 'Remarks' column following abbreviations shall be used - RR-Review of Records, T.C. - Test Certificate Submission & CHP - Customer Hold Point & JIR-Joint Inspection Report.
c. Test certificates shall be submitted at the time of final inspection.

Signature
Chamera Power Station-I, NHPC Ltd

(VENDORS Q.C. DEPT. OR REPRESENTATIVE)

गुणवत्ता आश्वासन योजना(QUALITY ASSURANCE PLAN) : (MODEL)

परियोजना (PROJECT) : CHAMERA POWER STATION-I, KHAIRI, DISTT C ग्राहक (CLIENT): एनएचपीसी लिमिटेड (NHPC LTD.)
VENDOR :
उपष्कर का नाम (NAME OF EQUIPMENT) : MV SWITCHGEAR NIT/P.O. REFERENCE :

क्रं. स. SR. NO.	मद/घटक ITEM /COMPONENT	जांच की प्रकृति NATURE OF CHECKS	जांच की मात्रा QUANTUM OF CHECKS	संदर्भ दस्तावेज़/स्वीकृति मानदंड REFERENCE ACCEPTANCE DOCUMENTS NORMS	रेकॉर्ड प्रारूप RECORD FORMAT	INSP. AGENCY			टिप्पणी REMARKS
						प्रदर्शन Perform	गवाह Witness	सत्यापन Verify	
6	**KWH meter**								
a)	Make, Type & Rating	Visual	100%	Tech.Spec./Appd.drg./IS:722	TC	2/3	-	1	TC
b)	Electrical Routine Test	Electrical	-do-	-do-	TC	2/3	-	1	TC
c)	Load Accuracy Test	-do-	-do-	-do-	TC	2/3	-	1	TC
7	**Indicating Instruments (Voltmeter, Ammeter etc)**								
a)	Make, Type & Rating	Visual	100%	Tech.Spec./Appd.drg./IS:1248	TC	2/3	-	1	TC
b)	Dimensional Check	Measurement	-do-	-do-	TC	2/3	-	1	TC
c)	Operational Test	Electrical	-do-	-do-	TC	2/3	-	1	TC
d)	Class/Accuracy	-do-	-do-	-do-	TC	2/3	-	1	TC
8	**MCCB, MCB & Contactors**								
a)	Make, Type & Rating	Visual	-do-	Tech.Spec./Appd.drg./IS:8828	TC	2/3	-	1	TC
b)	Operational Test	Electrical	-do-	-do-	TC	2/3	-	1	TC
c)	High Voltage Test	-do-	-do-	-do-	TC	2/3	-	1	TC
9	**Motors**								
a)	Make & Rating	Visual	-do-	-do-	TC	2/3	-	1	TC
b)	Torque Test	Electro Mech.	-do-	-do-	TC	2/3	-	1	TC
c)	Operational Check	Electrical	-do-	-do-	TC	2/3	-	1	TC
d)	IR and HV Test	-do-	-do-	-do-	TC	2/3	-	1	TC
10	**HRC Fuses**								
a)	Make, Type & Rating	Visual	100%	Tech.Spec./Appd.drg./IS 9385	TC	2/3	-	1	TC
11	**Control Cable**								
a)	Routine Test	Electrical	100%	Tech.Spec./ Approved drg./IS code	TC	2/3	-	1	TC
12	**Vacuum Interrupter**								
a)	Make & Rating	Visual	-do-	-do-	TC	2/3	-	1	TC
b)	Power Frequency Test	Electrical	Sample	-do-	TC	2/3	-	1	TC

Note: a. In 'Inspection Agency'column figure 1,2,or 3 to be filled. 1- will indicate 'Chamera Power Station-I, NHPC Ltd. ', 2/3- will indicate 'supplier' / 'sub-supplier'
b. In 'Remarks' column following abbreviations shall be used - RR-Review of Records, T.C. - Test Certificate Submission & CHP - Customer Hold Point & JIR-Joint Inspection Report.
c. Test certificates shall be submitted at the time of final inspection.

Signature
Chamera Power Station-I, NHPC Ltd **(VENDORS Q.C. DEPT. OR REPRESENTATIVE)**

गुणवत्ता आश्वासन योजना(QUALITY ASSURANCE PLAN) : (MODEL)

परियोजना (PROJECT) : CHAMERA POWER STATION-I, KHAIRI, DISTT C ग्राहक (CLIENT): एनएचपीसी लिमिटेड (NHPC LTD.)
VENDOR :
उपष्कर का नाम (NAME OF EQUIPMENT) : MV SWITCHGEAR NIT/P.O. REFERENCE :

क्रं. स. SR. NO.	मद/घटक ITEM /COMPONENT	जांच की प्रकृति NATURE OF CHECKS	जांच की मात्रा QUANTUM OF CHECKS	संदर्भ दस्तावेज़/स्वीकृति मानदंड REFERENCE ACCEPTANCE DOCUMENTS NORMS	रेकॉर्ड प्रारूप RECORD FORMAT	INSP. AGENCY			टिप्पणी REMARKS
						प्रदर्शन Perform	गवाह Witness	सत्यापन Verify	
13	**Springs**								
a)	Dimensional Check	Measurement	100%	-do-	TC	2/3	-	1	TC
b)	Load and Fatigue Test	Mechanical	Sample	-do-	TC	2/3	-	1	TC
c)	Material Check	Chemical	-do-	-do-	TC	2/3	-	1	TC
14	**Switches/Control Switches**								
a)	Make & Rating	Visual	100%	-do-	TC	2/3	-	1	TC
b)	Operation Test	Electrical	-do-	-do-	TC	2/3	-	1	TC
c)	IR & HV Test	-do-	-do-	-do-	TC	2/3	-	1	TC
15	**Isolating Contacts**								
a)	Dimensional Check	Measurement	100%	-do-	TC	2/3	-	1	TC
b)	Plating Thickness	-do-	-do-	-do-	TC	2/3	-	1	TC
c)	Contact Pressure	-do-	-do-	-do-	TC	2/3	-	1	TC
16	**Space Heater**								
a)	Make, Type & Rating	Visual	100%	-do-	TC	2/3	-	1	TC
b)	Routine Test	Electrical	-do-	-do-	TC	2/3	-	1	TC
17	**Surge Arrestor**								
a)	Make & Rating	Visual	100%	-do-	TC	2/3	-	1	TC
b)	Routine Test	Electrical	-do-	-do-	TC	2/3	-	1	TC
18	**Indicating Lamp, Push Button, Contact Block, Timer**								
a)	Make, Type & Rating	Visual	100%	-do-	TC	2/3	-	1	TC
b)	Operational Test	Electrical	-do-	-do-	TC	2/3	-	1	TC
19	**Insulating Mats**								
a)	Routine Test including MAT thickness	Electrical & Measurement	100%	Tech.Spec./ Approved drg./ IS:15652	TC	2/3	-	1	TC

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						प्रदर्शन Perform	गवाह Witness	सत्यापन Verify	
B)	**Final Inspection/Tests**								
1	**Potential/Voltage Transformer**								
a)	Make, Type, Rating & Visual Inspection	Visual	100%	Tech.Spec./ Approved drg./ IS:3156	TC	2/3	-	1	TC
b)	Terminal Marking & Polarity Verification	Electrical	-do-	-do-	TC	2/3	-	1	TC
c)	Power Frequency Test on Primary & Secondary Winding seperately	-do-	-do-	-do-	TC	2/3	-	1	TC
d)	Determination of Error according to the requirement of Appropriate Accuracy Class	-do-	-do-	-do-	TC	2/3	-	1	TC
e)	Over Voltage Inter Turn Test	-do-	-do-	-do-	TC	2/3	-	1	TC
2	**Current Transformer**								
a)	Make, Type, Rating & Visual Inspection	Visual	100%	Tech.Spec./ Approved drg./ IS:3156	TC	2/3	-	1	TC
b)	Terminal Marking & Polarity Verification	Electrical	-do-	-do-	TC	2/3	-	1	TC
c)	Power Frequency Test on Primary & Secondary Winding seperately	-do-	-do-	-do-	TC	2/3	-	1	TC
d)	Determination of Error according to the requirement of Appropriate Accuracy Class	-do-	-do-	-do-	TC	2/3	-	1	TC
e)	Over Voltage Inter Turn Test	-do-	-do-	-do-	TC	2/3	-	1	TC

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						प्रदर्शन Perform	गवाह Witness	सत्यापन Verify	
3	**Circuit Breaker (VCB)**								
a)	Make, Type, Rating & Visual Inspection	Visual	100%	Tech.Spec./ Approved drg./ IEC:62271-100&200 & 60694	JIR	2/3	1	-	CHP
b)	Resistance Measurement of Main Circuit	Electrical	-do-	-do-	JIR	2/3	1	-	CHP
c)	Operating Mechanism (5-Closing and 5-Opening Operations at specified maximu, minimum and rated voltage)	-do-	-do-	-do-	JIR	2/3	1	-	CHP
d)	One minute Power Frequency Voltage withstand test on the Main Circuit	-do-	-do-	-do-	JIR	2/3	1	-	CHP
e)	Voltage withstand Test on Control and Auxiliary Circuits	-do-	-do-	-do-	JIR	2/3	1	-	CHP
f)	Checking, Continuity of Earthing Circuit	-do-	-do-	-do-	JIR	2/3	1	-	CHP
4	**Routine Test on Switchgear/Panels/Boards**								
a)	Dimensions, Paint Shade & Thickness, Layout, Accessibility, Name Plate Check	Measurement/ Visual	100%	Tech.Spec./ Approved drg./ IEC:62271-100&200 & 60694	JIR	2/3	1	-	CHP
b)	BOM Checking and Equipment Mounting	Visual	-do-	-do-	JIR		1	-	CHP
c)	I.R Test (Before & After HV Test)	Electrical	-do-	-do-	JIR		1	-	CHP
d)	H.V. Test	-do-	-do-	-do-	JIR		1	-	CHP
e)	Functional (Electrical & Mechanical) Test	Elect./Mech.	-do-	-do-	JIR		1	-	CHP
f)	Wiring & Continuity Test	Electrical	-do-	-do-	JIR		1	-	CHP
g)	Interlock Scheme Check	-do-	-do-	-do-	JIR		1	-	CHP
h)	Earthing Circuit Check	-do-	-do-	-do-	JIR		1	-	CHP
i)	IP Class	Mech. Test	sample	Tech.Spec./ Approved drg./IS	TC		-	1	TC

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Chamera Power station-I, NHPC Ltd **(VENDORS Q.C. DEPT. OR REPRESENTATIVE)**

सुरक्षा मैनुअल

SAFETY MANUAL

P R E F A C E

Construction of Hydro-electric Project is a complex activity involving different operations going on at the same time in restricted working area as a result posing a safety hazard to the workmen and technicians involve in these operations. Yet, certain amount of safety consciousness does help to avoid or minimise accidents.

Accidents do not occur naturally but do so on account of certain definite reasons, most of whom can be foreseen, controlled or avoided. This Safety Manual has been drawn up with the objective of preventing recurrence of avoidable accidents in the construction of Hydro-electric Projects in this Corporation as well as ensuring a uniform and safe procedure for all construction work. The Project Authorities shall be responsible to see the provisions contained herein are followed in all works under their control to achieve the desired degree of safety. In additional they should always be alert for adoption of such measures as would result in improved working conditions and elimination of hazards. They should take prompt and reasonable precautions indicated by local conditions.

They shall also ensure that the contractors working under their control at the Projects also strictly observe safety methods. Suitable safety clauses shall be incorporated in all tender and contract documents. Strict penal action commensurate with the stipulated contract conditions should be taken against the defaulters.

In addition to this Manual, all applicable provisions of Central, States and Local Safety Laws and Regulations and Construction Codes as well as Indian Standard Safety Codes as issued from time to time, shall be observed by the Project Staff and the Contractor. Safety practices and instructions to be followed in connection with the electrical installation which have not been covered extensively in this Manual shall be followed as per provisions made in Indian Electricity Act, 1910 and Indian Electricity Rules, 1956 as amended from time to time. As regards detailed interpretation of their provisions, separate codes for safe design, construction, operation and maintenance of electrical installations shall be issued by the Generation Wing and a reference to the codes may be made for such details.

This Manual has been based upon the Safety Manual issued by the Central Water and Power Commission (now C.W.C.). Also, the suggestions regarding safety measures received from the Projects under N.H.P.C. and the recommendations of the various I.S.I. Codes on safety have also been consulted and necessary provisions incorporated in so far as these are applicable for Hydro-electric Projects.

CONTENTS

CHAPTER I

GENERAL

1.1 GENERAL:

The Engineers at site shall at all times exercise reasonable and proper safety precautions for the safety of the people at all works under their control, in accordance with instructions contained in this Manual. They shall also ensure strict compliance of the same by their subordinates. Also, they shall see that the contractors executing works under their control adopt stipulated safety measures and adequately protect their workers.

In addition to instructions contained in this manual the safety regulations contained in the below mentioned ISI codes shall also apply wherever the provisions in the ISI codes are exhaustive in nature:

I.S. SAFETY CODES:

1. IS 3764 1966 Excavation work
2. IS 4756 1978 Tunnelling Work (first revision)
3. IS 7293 1974 Working with Construction Machinery
4. IS 7969 1975 Handling & Storage of building materials
5. IS 4081 1967 Blasting and related drilling operations.
6. IS 3696 1966 Scaffolds & ladders (Pt. I (Pt. I) Scaffolds)
7. IS 3696 1966 Scaffolds & ladders (Pt. II (Pt. II) ladders)
8. IS 4138 1977 Working in compressed air (Ist revision)
9. IS 4912 1978 Safety and health protection in electric gas in welding and

cutting operations.

10. IS 818 1968 Safety requirements for floor and wall openings Railway and toe Boards.
11. IS 5121 1969 Piling & other Deep foundations
12. IS 4130 1976 Demolition of Buildings (Ist revision)
13. IS 5916 1970 Construction involving use of hot bituminous materials.
14. IS 3016 1965 Fire protection in welding and cutting operations.

1.2 ENFORCEMENT OF SAFETY REGULATIONS:

1.2.1 Chief General Managers/General Managers, Superintending Engineers, Executive Engineers, Supervisors and all other officials in charge of execution of work at the various organisational levels in the project shall ensure strict enforcement of safety regulations in the execution of works.

1.2.2 To assist the executive and supervisory staff of the project in spelling out the safety programmes and regulations prescribed in the Manual, a separate safety unit should be included in the project staff. This unit should consist of a Safety Engineer of the rank of Executive Engineer or Senior Assistant Engineer and a number of safety inspectors to assist him. The number of safety inspectors will depend on the magnitude and distribution of work. The safety engineer will be directly responsible to the Chief General Manager or other Engineer-in-Charge of the project in keeping him informed of the compliance or otherwise of all safety regulations and standards by the various executives, supervisory staff and contracting firms and assist him in maintaining safe standards of working.

The detailed duties of the safety staff shall be as under:

a) To look into all procedures and practices and examine temporary structures, the failure of any of which may result in an accident.
b) To go around the works regularly and advise the contractors and the department as to the measures to be taken to ensure safety of the works whether under the contractors or under the department.
c) To see that the rules and regulations laid down in the safety manual are observed. Non-compliance with these regulations if any, should be brought to the notice of the Safety Engineer.
d) To develop and execute programmes for the training of supervisory personnel in the application and observance of safety practices.

e) To receive and analyse reports of all accidents and fires and initiate corrective actions warranted by the situations.
f) To conduct safety education and propaganda.
g) To recommend revisions or additions to the safety manual on safety measures in the light of project experience.
h) To prepare safety posters, signs, displays, leaflets, bulletins, etc., and display them on neat attractive bulletin boards. Cartoons may also be displayed.
i) Suggestions from the workers may also be obtained by means of suggestion boxes which may be kept at various places.
j) Make certain that all Central Government, State Government or local laws and ordinance are complied with

1.2.3 A Project Safety Committee shall be constituted under the Chairmanship of Chief General Manager of the Project, and shall have members from amongst the Senior Officers, Safety Engineer and representative of the contractor. The number of the members may vary and shall be decided by the Chief General Manager according to the magnitude of the work and jobs involved. This Committee would meet from time to time, generally supervise the Safety arrangements, advise and give suggestions to the Safety Engineer, and consider the reports of the safety engineer.

1.3 CONTRACTORS' SPECIAL ESPONSIBILITIES:

1.3.1 The contractors shall at all times exercise reasonable and proper precautions for the safety of the people on the works and shall comply with the provisions of current safety laws, building and construction codes of the State Governments as may be applicable. All machinery and equipment and other sources of physical hazards shall be guarded in accordance with the requirements of this manual and regulations or laws of the State Governments of the Government of India.

1.3.2 In order to supervise the work from point of view of safety, the contractor shall provide a full time Safety Engineer who shall report and be responsible to the Safety Engineer of the Corporation, an executive or his designated representative and shall be responsible for coordinating the safety programmes.

1.3.3 The contractor shall provide all necessary fencing and lights to protect the public from accidents and shall be bound to bear all the expenses of defence of every suit, action & other proceedings at Law that may be brought by any person for injury sustained owing to neglect of the above precautions and to pay any damages and costs which may be awarded in any such suit, action & proceedings to any such persons or which may with the consent of the contractor be paid to compromise any claim by any person.

1.4 IMPORTANT SAFETY RULES:

i) Each employee shall be provided initial indoctrination regarding safety by the contractor so as to enable him to conduct his work in a safe manner.
ii) No employee shall be given a new assignment of work unfamiliar to him without proper introduction as to the hazards incident thereto, both to himself and his fellow employees.
iii) Under no circumstances shall an employee hurry or take unnecessary chances when working under hazardous conditions.
iv) Employees must not leave naked fires unattended. Smoking shall not be permitted around fire prone areas and adequate fire fighting equipment shall be provided at crucial locations.
v) Employees under the influence of any intoxicating beverage, even to the slightest degree should not be permitted to remain at work.
vi) There shall be a suitable arrangement at every worksite for rendering prompt and sufficient first aid to the injured under the guidance of a Medical officer.
vii) The staircases and passageways, shall be adequately lighted.
viii) The employees when working around moving machinery, must not be permitted to wear loose garments. Safety shoes are recommended when working in shops or places where materials or tools are likely to fall. Only experienced workers shall be permitted to go behind guard rails or to clean around energized or moving equipment.
ix) The employees must use the standard protection equipment intended for each job. Each piece of equipment shall be inspected and after it is used.

1.5 ACCIDENT REPORTS:

1.5.1 Monthly reports on prescribed proforma of all accidents shall be promptly submitted to the Safety Engineer of the Corporation, with a copy to the Engineer-in-Charge giving such data as may be prescribed by the contracting officer.

1.5.2 On the occurrence of any accident a report should be made to the Safety Engineer of the Corporation with a copy to the Engineer-in-Charge within 12 hours of the occurrence of the accident. In case of fatal accidents or those which are so serious that they are likely to result in the death of any workman, a report should be made immediately to the Engineer-in-Charge of the work.

1.5.3 The following sample forms (specimens attached at the end of this Chapter) may be used for reporting accidents and keeping relevant statistics:

INJURY REPORT-PRELIMINARY

(To be submitted immediately after the accident)

(N.B.)-Answers to all the items should be precise and definite.

No. ……

Date……

1. Name of the person injured
2. Sex, Adult/Minor
3. Department/Project/Division
4. Designation
5. Regular/Work Charged/ Muster-Roll /Contractor's employee
6. Date & hour of accident
7. Cause of accident
8. Fatal, serious or minor

Signature with designation of

Reporting Officer

To

Medical Officer

9. Nature of injury

10. Period of estimated disablement.

Signature of Medical Officer.

Distribution:

1. Engineer-in-Charge
2. Safety Engineer

C. INJURY REPORT-DETAILED

Project……Date of Report……

Section-I Name…….Age…….Occupation

Who was injured? Employer…How long employed….

Salary or wage….Dates of previous injuries

Remarks……

Section-II Date of injury……..Time

Time & Place Exact place where injury occurred……..

Section-III Describe injury……

Name & Severity of injury……

Did injury result in death or

Probable permanent disability……

Yes/No.

Return to work ……..

Date of death ……

Section-IV (Description of Accident which caused the injury)

Describe the accident in full……

……

Section-V Type of Accident (Check one)

Fall of person- Same level

Falls of persons-One level to another

Flips (Causing strains not falls)

Struck by flying, rolling, sliding object

Stepping in or on object

Strains or sprains-lifting

Struck by or cut by hand tools

Other injuries from handling objects.

Burning or scalding

Electric shock or flash Explosions

Caught in or between

Striking against object

Struck by or run over by vehicle

Buried or partially buried by collapse of sides or fall of material

Drowning or suffocation

Poisoning, Infection

Other Describe……..

Section VI (Supervisor/Foreman's Statement)

I have personally investigated this accident, and concur in the analysis of causes given below:

Recommendation for prevention……...

Remarks……..

Signature of Foreman or other Immediate Superior.

Causes of the Accident

(To be completed by the Safety Engineer)

For one cross (x) in the appropriate box in Section 7, Mechanical causes; and one cross (x) in Section 8, Personal causes, Select the cause in each Section which could have been most readily removed and the removal of which would have helped most to prevent the accident. In addition to marking the appropriate box, describe briefly but exactly the causes selected. Secondary or contributing causes may be indicated by drawing a circle in the appropriate box.

Section VII Improper guarding……

(Unguarded, inadequately guarded, guard removed etc.)

Defective substances or equipment…….

(Broke, poorly designed, slippery, defective brakes etc.)

Hazardous arrangement…… ……(Unsafely piled material, poor labour, poor house-keeping, loose rock etc.)

Improper illumination……..

Improper ventilation……

(poor, dusty, gassy, high humidity, excessively hot etc.)

Improper dress or appeal……

(Goggles, gloves, shoes, hard hat respirator etc.)

No mechanical cause

Insufficien t data to classify

Section VIII (Personal Causes)

Injured person Other person

Physical or mental defect……..

(Poor eye sight, arm amputated, deaf, epilepsy, etc)

Lack of knowledge or skill……

(Unable to read, poor training, etc.)

Wrong attitude……

(Deliberate, chance-taking, disregard for instructions, etc.)

No Personal causes Insufficient data to classify

Section IX (Supervisory Fault)

Was Inadequate or faulty supervision or foremen ship a cause or contributing cause of this accident? ……

(Yes or No)

Explain ……..

Section X (Corrective Action)

What has been done to prevent the occurrence of similar accidents in the future?…… ……..

This Report submitted by……

(Safety Engineer)

Approved……

(Construction Engineer or Superintendent)

CHAPTER 2

EXCAVATIONS

2.1 OPEN EXCAVATION-EARTH & ROCK

2.1.1 The serious hazards of excavation jobs are falls and falling objects. Accident prevention measures should be adopted and effectively carried out on each job.

2.1.2 The sides of every excavation, where there is a danger of fall or dislogement of earth, rock or other material forming the side of or adjacent to any excavation shall be securely supported by adequately braced timber of suitable quality or other material unless the sides of the excavation are sloping to a safe angle.

2.1.3 No excavation of earthwork below the level of any foundation of a building or structure shall be commenced or, continued unless adequate steps are taken to prevent danger to any person employed, from collapse of the structure or fall of any part thereof.

2.1.4 In every excavation work along sloping ground, sides and slopes of excavation shall be maintained in a safe condition by scaling, benching or barricading. Loose earth and loose rock shall be continually sealed down. To ensure safety of workers engaged on such work, each worker shall be provided with a hard hat and a safety belt attached to a safety line. On steep slopes, workers shall not be permitted to work one above the other. All scaling work shall be done under the direct supervision of an experienced foreman.

2.1.5 Excavation, if over 1.2 m in depth, unless in solid rock or shale, shall be either shored, sheeted and braced or sloped to the angle of repose of the material when saturated. All shoring and bracing shall extend to bottom of excavation where necessary.

2.1.6 To hold banks of loose and unstable materials from sliding adequate shoring shall be used and under cutting of banks shall not be permitted. The bracing and shoring of trenches shall be carried out along with the excavation.

2.1.7 Additional precautions by way of shoring and bracing shall be taken to prevent slides, slips or caveings when excavations or trenches are made in locations subject to vibrations from rail-road or highway traffic, or the operations of machinery or any other source of vibration. The heavy construction machinery shall not be taken within a distance equal to the depth of the trench if the depth is less then 6m or 6 meters if the depth is more than 6m.

2.1.8 Materials used for bracing, shoring etc. shall be in good serviceable condition and timber shall be sound and free from large or loose knots.

2.1.9 Excavated or other material shall not be stacked with in 1/3rd of depth of the pit or 1m whichever is more, away from the edge of any excavation and shall be stored and retained so as to prevent it from falling or sliding back into the excavation and to prevent excessive pressure upon the sides of the excavation.

2.1.10 In all trenches 1.5m or more in depth, ladders extending from the floor of trench excavation to at least 1m above top of excavation shall be provided and so located as to provide means of exit without more than 15m of lateral travel.

2.1.11 Excavation areas shall be adequately lighted for night work.

2.1.12 During hours of darkness all public sidewalks be adequately illuminated and warring lights about the excavation shall be provided to ensure safety of pedestrians and vehicular traffic.

2.1.13 At all approaches and exits of the sites of excavations danger and warning signal shall be placed. To emphasize the danger, a flagman with a red flag shall also be posted to warn the public or approaching trucks and to direct trucks in and out of the site of excavation.

2.1.14 Every accessible part of an excavation pit or opening in the ground into which a person is liable to fall vertically from a height of 2m or more a suitable barrier about one metre high shall be provided.

2.1.15 INSPECTION & EXAMINATION;

a) No person shall work in any excavation, shaft, earthwork or tunnel unless all timbering and plant sued therein are inspected by a competent person before work is started and also after explosives have been used in or near the excavation, shaft, earthwork or tunnel.

b) When open excavations with steep side slopes are carried out by means of blasting, after every blasting operation, the side slopes of excavations shall be carefully examined by a competent person to prevent rock falls. Work inside the

excavations shall not commence until all loose rock on the sides is first removed. All workers engaged in such excavations shall use hard hats.

2.1.16 No material or loan shall be placed or stacked near the edge of any excavation, shaft, pits or opening in the ground which may endanger persons works below.

2.1.17 Adequate measures shall be taken to prevent workers and spectators from approaching the dangerous areas. Visitors shall not be allowed on the scene of excavations unless they are accompanied by a supervisor.

2.2 TUNNEL & SHAFT EXCAVATION:

2.2.1 Frequent careful inspection of tunnel walls and roof and through scaling or removal of loose rock are necessary to prevent rock falls. Ample illumination, good housekeeping and safe walkways are important factors in the prevention of accidents. All tunnel workers shall wear hard hats and hard toes shoes.

2.2.2 In every excavation of shaft and tunnel, sufficient safe means of access shall, be provided to every place at which any person has at any time to work.

2.2.3 In tunnelling, the drilling rigs shall be carefully designed, built and maintained. High drill rigs shall be provided with suitable railings around the top decks. All drilling shall be done wet. All the safety precautions for drilling or for the use of drills as given in chapters 3 & 5 shall be taken.

2.2.4 Care shall be taken in handling and use of explosives as specified in this Manual (Chapter 3). The loading of a round shall be completed preferably by the crew starting the work. Firing of round shall be the responsibility of the licentiate blaster and shall be done under his strict supervision.

2.2.5 After blasting inside a tunnel or shaft, scaling and removal of rock or loose material shall not commence unless the roof and walls of the tunnel and sides of a the shaft are carefully inspected by a competent person and loose rock from the roof and sides is first removed or unstable material is properly supported by shoring to prevent rock fall. When tunnelling with "Heading & Benching" method the heading supports shall be secured by anchoring before cutting the bench.

2.2.6 Dump cars shall be kept in good condition and shall be equipped with safety couplers. The use of rolling equipment with link couplers shall not be permitted. Rocker or cradle type dump cars shall be provided with a positive type lock to prevent accidental dumping. Dump cars shall not be overloaded.

2.2.7 a) Motive power, other than electric, shall not be used without prior authorisation from the project head. No petrol engines shall be used underground. Diesel locomotives shall not be used underground unless equipped with a filter that will remove all carbon monoxide and oxides of nitrogen. Such filters shall be inspected in each shift by the master mechanic and more frequently by the locomotive operator.

b) Every locomotive shall have headlights on each end. It shall be equipped with whistles or horn with a tone of sufficient volume to be heard by men along the track even when the air drills are working. There shall always be a flag man with loco and mine cars while mucking is being done.

2.2.8 The tracks shall be properly laid using rails of sufficient weight and shall be kept in safe operating conditions.

2.2.9 The ventilation system shall be adequate to maintain circulation of air in all parts of tunnels and shafts and following conditions shall be taken care of:

a) Air shall be considered unfit for workmen to breathe if it contains any of the following:

i) Less than 19.5 per cent oxygen by volume.
ii) More than 0.5 per cent carbon dioxide by volume.
iii) More than 0.01 per cent carbon monoxide by volume.
iv) More than 0.001 per cent hydrogen sulphide by volume.
v) More than 0.003 per cent oxides of nitrogen.
vi) More than 0.5% of methane at any place in the tunnel.
vii) More than 0.0005% of aldehyde.

Any other poisonous gas in harmful amounts.

b) In addition to the requirements given above, 2 cum of air per minute shall be furnished for each brake horse power of diesel locomotive used in the tunnel.

2.2.10 Sufficient general lighting shall be provided in the tunnels & shafts so that the

pedestrians should have not need to use hand torches for walking safely.

2.2.11 All electric wiring shall be extra-heavy insulated and of sufficient capacity supported on insulators of approved type and not looped on or tied to spikes, ventilating pipe, or other makeshift supports. All switches shall be of the safety type. Lines shall be located so as not to create any electricity or tripping hazard to workers.

2.2.12 No inflammable materials or oil and grease shall be stored inside or near the tunnels or shafts and all combustible rubbish from the tunnel or shaft shall be promptly removed.

SHAFT EXCAVATION:

2.2.13 Head frames or shafts shall be open framework design and constructed from sound fire resisting materials. All sheaves should be of the proper diameter of the cable or hoist rope used shall be amply strong, properly mounted and frequently inspected.

2.2.14 Covered stairways a least 75cm. Wide shall be erected in all shafts except during the sinking period. If not possible to construct such a stairway a ladder shall be installed with landing at every 6 m of sufficient width, to permit men to pass. Where one or more drifts are to be driven from the shaft, landing shall also be provided at each drift in the man shaft. The distance between the centres of the rungs of ladder shall not exceed 35 cms and shall not vary more than 25mm in any one ladderway. The width of ladder inside of stringers shall not be less than 30cms. The rungs of a ladder shall in no case be less than 15cm from the wall or from any obstruction in the shaft or opening. Under no circumstances shall a ladder be installed including backwards from the vertical. Should it become necessary to offset a section of ladderway, the top of a section shall extend not less than 1 m above the bottom of the section above or a handhold shall be provided. The side rails of the top-most section shall extend at least 1m above the ground.

a) Fixed ladders of standard construction shall be provided for access to cable sheaves on head frames located over tunnels shafts. A runway or platform equipped with guard rails and toe boards shall be provided next to cable sheaves.

b) Timbers and projections on which debris may lodge on ladder ways and stair ways in daily use shall be regularly cleaned of all loose rock and other debris.

2.2.15 All hoisting equipment including ropes and cables shall be thoroughly inspected at lease once a week and maintained in good condition. Suitable standby power supply arrangements or alternate means of working hoist mechanically shall be provided. Hoists shall never be loaded in excess of the maximum safe loads. Much buckets shall not be heaped up and no one shall remain under a bucket while it is being hoisted. Hard hats and hard-toe shoes shall be worn by every one engaged in shaft excavation. When hauling tools that project above the rim of the bucket, the tools should be loaded in such a manner that neither the bucket nor the tools shall come in contact with the sidewalls of the shaft.

2.2.16 Where tunnels are drives from shaft and a communication system is required, the telephone system shall be established. Ready communication must be maintained between the surface shaft and underground stations.

2.2.17 The shaft shall be protected with a two-rail guardrail at least 1 m high, with two bolts to prevent them from falling into the shaft. The gate opening into the shaft shall be closed at all times except when necessary to enter and leave the shafts or to empty the bucket or send materials down the shaft. Preferably the gates should be automatic in operation.

GASSY TUNNELS:

2.2.18 There must be a provision of automatic methane gas detector at face which is capable of giving warning when CH_4 (methane) exceeds more than 0.5% at the heading (MSA methane automatic detector 4 type).

2.2.19 Electrical equipment used inside the tunnel should be FLP construction.

2.2.20 Regular checking of methane gas by methane detector and proper recording of gas at every face in each shift is recommended.

2.2.21 A man shall be posted at each entry for checking of lighters, match-boxes etc. being taken inside by workers etc.

2.2.22 Tools and tackles made out of light alloys (such as Al and Mg) are not to be used inside the tunnels. They may cause sparks.

2.2.23 There must be a provision for approved type of safety lamps for each face to indicate the presence of black damp (i.e. Carbon dioxide formation at face).

2.2.24 When the tunnel heading is approaching some fault zone or sand dyke etc. care should be taken with respect to the heavy built-up of gas and bad roof.

2.2.25 Advance bore-holes of small size (37-42 mm) may be drilled at the tunnel face to give indication about the presence of gas and their strata condition. Their number may very from 2 to 4 of 5 to 10 m long at an angle of 7' to 10' to the horizontal.

2.2.26 In case Methane is being tapped at a high pressure de-gassification by drilling long bore holes and applying high suction pressure 300 mm of Hg in the pipe line shall be done.

2.2.27 Shot firing should be minimised in a gassy heading. But should it be essential to do so, only permitted explosives with proper stemming material and approved FLP exploders shall be used.

2.2.28 Before shot firing the gas percentage at the face shall be checked and if the percentage of the gas found at the heading is more than 1% the blasting shall not be done.

2.2.29 Regular checking of gas at the faces shall be done before each shift.

2.2.30 After stoppage of ventilation, the gas percentage should be checked by some authorised person when the ventilation is restored. If the gas content is less than 0.5% then only the men may be allowed to resume work.

2.2.31 The use of diesel locomotive is generally not recommended inside the tunnel even if it is of FLP construction

2.2.32 The gas accumulation at the face shall be checked at the beginning of each shift and the presence of CO_2 shall be ascertained using flame safety lamp. If the condition is satisfactory then work-men may be allowed to approach the tunnel heading.

2.2.33 In case of tunnels where methane gas indicated there shall be a safety officer having qualification of Coal Mines Sr. Manager's Certificate of competency (at least 2nd class) to look after the proper ventilation aspect of the tunnel.

2.2.34 If the project is far away from any rescue station, some rescue apparatus, co-detectors etc. shall be procured which will be of help in case of emergency. Some project personnel should be trained to handle rescue apparatus as their training may be of much use in case of any gas explosion.

2.2.35 While fans are operating in series, it shall be ensured that all the fans in a duct line are working. In case of stoppage of any fan, there must be some signalling arrangement to indicate the failure.

2.2.36 If at any place the methane gas percentage exceeds 0.5% person should be withdrawn from the tunnel, electricity to be switched off and appropriate measures should be taken as described earlier.

2.2.37 The ventilation in gassy tunnels should be properly designed after analysis of the gases observed inside the tunnel.

2.2.38 There should be no breakage in pull duct line of the ventilation system.

2.2.39 At no cost, welding and cutting by gas should be allowed inside the gassy tunnel.

2.2.40 A regular analysis of the gases inside the tunnel should be got done with advance of the tunnel.

2.3 COFFER DAMS-CONSTRUCTION AND MAINTENANCE:

GENERAL:

i) Every coffer dam or caisson and every part thereof shall be of good construction, suitable and sound material and of adequate strength. It shall be properly maintained. Its construction, additions or alterations and dismantling including all work connected therewith shall be supervised by a competent person.

ii) A cofferdam or caisson shall, where necessary, be specially secured in position so as to prevent movement in a manner dangerous to persons employed.

iii) In any cofferdam or caisson, there shall be adequate means for persons to reach places of safety in the event of any inrush of water.

INSPECTION AND EXAMINATION:

iv) No person shall be employed in a cofferdam or caisson unless it has been inspected once a day by a competent person and also after explosives have been used in or near the cofferdam or caisson in a manner likely to affect its strength and stability. Necessary entry to the effect that the cofferdam or the caisson has been inspected shall be made in the register prescribed for the purpose.

ATTENDANCE AND EQUIPMENT:

v) No person shall be employed as an under-water diver except for shallow depths where skin divers are employed unless:
   a) A sufficient number of competent persons are employed in attendance upon him as to ensure his safety, and
   b) There are provided and readily available, in good working order, sufficient and suitable diving plant and equipment, including air pumps, pressure gauges, and means of access to and from water and including at least one diving dress and one complete set of woollen clothing in excess of the number of divers under water at any one time and
   c) Another diver above water provided with suitable equipment and plant is immediately available to the assistance of any diver under water in case of emergency.

TESTS AND EXAMINATION OF EQUIPMENT:

vi) All diving equipment shall initially tested and thoroughly examined by a competent person and thereafter thoroughly examined by him after every three months, and record of such tests and examinations entered in a register maintained for the purpose

vii) Air pump, airlines and diving helmets shall be thoroughly examined for any defect every time before they are put to use.

SIGNALLING:

viii) In all diving operations, efficient signalling system to enable the diver to be in communication with his attendant shall be maintained.

MEDICAL EXAMINATIONS:

ix) No person shall be employed under water as a diver unless he has within the previous four days been examined by a project doctor or by certifying surgeon or by a medical officer of the contractor or firm and certified by him as fit for diving.

2.4 DEMOLITION:

i) All demolition work shall be placed under the supervision of a competent person experienced in demolition work.

ii) During demolition work all electrical cable and water, gas or steam pipes shall be disconnected except those which are used for the operations.

iii) All steps shall be taken to prevent danger to persons employed from risk of fire or explosion due to gas, vapour or flooding due to water from watermains, sewers and culverts.

iv) All practical steps shall be taken to avoid danger from collapse of the structure when any part of the framing is removed from a framed or partly framed structure which may endanger life of any person employed.

v) Before demolition is commenced and also during the progress of the work, precautions shall, where necessary, be taken by adequate shoring or otherwise to prevent the accidental collapse of any part of the structure of any adjoining structure the collapse of which may endanger any person employed.

vi) Warning signs and red lights should be placed wherever there is danger to public, and the structure under demolition should be adequately barricaded and roads leading to the site of demolition should be closed so that people are kept away from the hazardous area.

CHAPTER 3

EXPLOSIVES, DRILLING AND BLASTING

EXPLOSIVES:

3. GENERAL:

3.1 All operations involved in transportation, handling, storage and use of explosives shall be as per Indian Explosives Act and shall also conform with the provisions made hereunder.

3.2 SUPERVISION:
Explosive shall be handled by or under the supervision of competent persons who are fully experienced in the work and who have received adequate instructions as to the dangers connected therewith and the precautions to be observed.

3.3 TRANSPORT AND HANDLING:

i) Explosives shall not be transported to the site of operations except in suitable cases or containers which are so made as to prevent any spillage of explosives and any danger of sparks or other sources of ignition during conveyance. No explosive shall be removed from such cases or containers except when it is to be used forthwith for the purpose of work.

ii) No explosives shall be transported in mechanically propelled vehicle unless such vehicle is locked and is of a type approved in writing by the Chief Inspector of explosives. The following rules should also be observed:

a) Vehicles must have springs under the body. Unsprung country carts should be not used. Tyre pressures shall be as per Indian Explosives Regulations.

b) Detonators and igniters must not be carried in the same vehicle with explosives.

c) The speed of vehicle must not exceed 24 Kms per hour.

d) Besides the driver, only one helper shall be accommodated in the vehicle. The vehicle carrying the explosives must not be transport workmen or other materials to workspots although there may be enough space for men or material.

e) Drivers must not leave the vehicle unattended while transporting explosive.

f) All vehicles transporting explosives shall be marked on play carded on both sides and ends with the words "EXPLOSIVES" in while letters not less than 75 mm tall on a red background. All explosive boxes shall bear explosives Lot No., Mfg. Date, expiry date etc. clearly on them.

g) A motor vehicle carrying explosives should not be refilled except in emergencies and even then only when motor is stopped and other precautions taken to prevent accidents. Such vehicles should invariably have at least two fire extinguishers placed at convenient points.

h) Vehicles transporting explosives shall never be taken into a garage, or repair shop, or parked in congested areas, or stored overnight or at any other time in a public garage or similar building.

i) Explosives shall not be transported on a public highway during hours of darkness except in extreme emergency and even then only with the written approval of the project officials.

j) Explosives shall not be transported in any form of trailer, nor shall any trailer be attached to a motor truck or vehicle hauling explosives.

k) No transfer of explosives from one vehicle to another shall be made on any highway except in case of emergency.

l) Persons employed in the transport or handling of explosives should not carry with them or in the vehicles, matches, loaded fire arms, petrol or any flame producing devices.

m) All explosives should be adequately protected against theft

n) Smoking shall be prohibited during handling and transport of explosives.

iii) Motor vehicles used for transporting explosives shall be carefully inspected daily to ensure that;

a) Filled and serviceable fire extinguishers are in position:

b) The electric wiring is well insulated and firmly secured;
c) Chassis, engine and body are clean and free from surplus oil and grease:
d) Fuel tank and feed lines are not leaking;
e) Lights, breakers and steering mechanism are in good working order; and
f) Vehicle is in proper condition in all respects for the safe transportation of explosives.

iv) Boxes of explosives should not be handled roughly or allowed to fall.

v) Containers of explosives shall be opened only by means non-sparking tolls or instruments.

vi) After the loading of a blast is completed, all excess explosives and detonators shall be removed to a safe location or returned at one to the storage magazine, observing the same rules as when being conveyed to the blasting area.

vii) Containers for detonators shall always be used only for storing detonators.

3.4 STORAGE:

i) The magazine should, at all times be kept scrupulously clean. High explosives like dynamite should be stored in a dry, clean, well-ventilated, bullet-proof and fire-proof building constructed in accordance with Indian Explosives Act, on an isolated site. The area around the magazine for a distance of 8m shall be kept clear of all vegetation and combustible matter. There shall be a barbed wire fencing and security lights around the magazine and security guards shall be posted for 24 hours.

ii) No unauthorised person is at any time to be admitted into the magazine.

iii) The person in charge of the magazine is to take care the magazine is well securely locked.

iv) The magazine on no account is to be opened during or on the approach of a thunderstorm and no person should remain in the vicinity of the magazine during such storm. Sufficient number of lighting conductors should be provided on top of the magazine.

v) Magazine shoes, without nails, should be kept at all time in the magazine, and a wood tub or cement trough, about 30 cms high and 45 cms in diameter, filled with water should be fixed near the door of the magazine.

vi) Person entering the magazine must put on the magazine shoes provided for the purpose, and be careful not to allow the magazine shoes to tough the ground outside the clean floor.

vii) Persons with bare feet shall, before entering the magazine, dip their feet in water, and then step direct from the tub over the barrier (if there is one) on to the clean floor.

viii) A brush or broom should be kept in the lobby of the magazine for cleaning the magazine on each occasion it is opened for the receipt, delivery or inspection of explosives.

ix) Light should be obtained from an electric storage battery lantern. Electric lights from the supplying main, taken through conduit wiring and properly earthed may be obtained with the approval or Chief Inspector or Explosives.

x) No matches should be allowed in magazine.

xi) No person having articles of steel or iron on him is to be allowed to enter a magazine.

xii) Oily cotton rages, cotton waste and articles liable to spontaneous ignition, should not be taken into a magazine.

xiii) Workmen, sweepers, etc. should be examined before they enter the magazine to see that they have none of the article mentioned in rules (x), (xi), (xii) on their person. All other men entering a magazine should not also have such articles on their person.

xiv) No tools or implements other than those of copper, brass, gun metal or wood should be allowed inside the magazine. Tools should only be used with great gentleness and care.

xv) Boxes of explosives should not be thrown down or dragged along with floor and should be stacked on wooden trestles. Where there are white ants, the legs of the trestles should rest in shallow copper lead or brass bowls, containing water.

xvi) Packages containing explosives shall not be allowed to remain in the sun.

xvii) The order of storing should be such as to allow the oldest explosives to be used first. There should be sufficient space between the stacks.

xviii) Empty boxes should not be stored in the magazine not let any packing material lie loose.

xix) Blasting caps and electric blasting caps should never be stored in the same box, magazine or building with other explosives.

xx) The following should be hung up in the lobby of the magazine.
  a) A copy of these rules;
  b) A statement showing the stock in the magazine; and
  c) Certificate showing the last date of testing of the lighting conductor.

xxi) All magazines which contain more than 115 kgs of high explosives such as Blasting Gelatine, Carbonates, Calcite Dynamite, Gelignite, Monobel Powder, Phoenix Powder, Roburite, Tonite and Ammonal etc should be impacted at least twice a year by the officer in charge thereof.

xxii) Adequate fire fighting equipment shall be provided in the magazine.

xxiii) Signboards reading "DANGER HIGH EXPLOSIVES" "PROTECTED AREA" "NO SMOKING" etc. shall be conspicuously displayed in front of the magazine.

xxiv) Proper CRP/Police Guard shall be posted to guard the magazine.

3.5 DRILLING:

a) GENERAL:

i) The position of all holes to be drilled must be marked out with white paint.

ii) All holes shall be of greater diameter than the diameter of the cartridges of explosives used.

iii) Loading and drilling shall not be carried out at the same time in the same area.

iv) A drill, bick, or pore shall not be inserted in butts of old holes even if examination fails to disclose explosives.

v) Drilling shall not be resumed after blasts have been fired until a thorough examination has been made to make sure that there are no unexploded charges which the drills may strike.

vi) Drilling shall not be started until all remaining butts of old holes are examined for unexploded charges.

vii) Rock drillers should be provided with approved, respirators in sillicious dusty atmosphere arising out of drilling operations.

b) LOADING:

i) Bore holes must be cleared of all debris before a cartridge is inserted.

ii) In loading bore holes, tamping shall be done with a wooden mallet having no exposed metal parts.

iii) Primed cartridges shall be seated by even steady pressure only.

iv) All loaded holes or charges shall be checked and definitely located before firing.

v) When holes are sprung, ample time shall be left between spring shots for the holes to cool, and also between the last springing shot and the loading of the main charge.

vi) When practicable no more cartridges shall be primed than are required for a round of blasting.

vii) Detonators shall be inserted only in a hole in the end of a cartridges prepared specially for that purpose.

viii) Holes in cartridges shall be made with a sharpened wooden stick.

ix) All charges, before being fired, shall be covered with blasting mats where blasting is done in the vicinity of structures likely to be injured by flying debris.

x) Detonating cord shall be cut from supply reel before attaching to explosive or tamping in hole. Use of the short pieces of fuse shall be prohibited for detonation purposes.

xi) No welding shall be done inside the tunnel at the time of loading of the face, till the blast has been taken.

c) WIRING:

i) All electric caps in a blast shall be of the same manufacture.

ii) Each electric blasting cap shall be tested with an approved galvanometer before and after tamping in a hole to determine whether it will carry the current. All testing shall be done away from the tunnel face.

iii) After testing the leg wires of electric blasting caps, they shall be short circuited by twisting the bare ends together and shall remain so twisted until ready to be connected into the circuit preparatory to connecting to the firing line.

iv) Unless the power supply is heavy, it is recommended that all electric blasting caps shall wired in series and firing line shall not be smaller than No.14B and S gauge copper wire.

v) The number of electric blasting caps used in a circuit shall not exceed the tested capacity of the blasting machine.

vi) The circuit, including all caps, shall be tested with a circuit tester or galvanometer, operating accurately, before being connected to the firing line.

vii) Cartridges shall not be primed nor boles loaded during the approach of a thunderstorm or while it is in progress. If a charge has been primed or holes loaded, every person should be ordered to a safe distance until the storm is over.

viii) Blasting circuit wires shall never touch another wires carrying electric current.

ix) Blasting operation control shall consist of two switches, a safety switch and a firing switch located at least 2 meters apart, the connection between the switches to be made by a "Plug in" jumper which may be permanently attached to the safety switch. The “plug in” jumper is so made that it cannot be plugged into or connected to the firing switch until the firing switch is unlooked and the jumper must be disconnected from the firing switch before the firing switch can be locked.

x) Both the safety switch and the firing switch shall be of the locking, double pole, double throw type which when opened and locked in downward position short circuit and ground the leading wires.

xi) Both the switches shall be locked immediately after firing the short and before any person is allowed to return to the area. Keys to the switches shall remain in the possession of the starter at all times.

d) FUSE BLASTING:

i) The length of fuse to be used in blasting shall in no case, be less than 75 cms but shall not be less than that required by State Law, if any.

ii) Blasters or shot firers should be cautioned always to use sufficient lengths of fuse to permit them to reach a safe place before the first hole is fired. The fuse lengths given in the following tabulations are suggested for normal conditions.

FUSE LENGTHS

Number of holes	Burning Rate 40 sec/foot	Burning Time
4-10	1.8 metre	4 minutes
11-12	2.15 metre	4 minutes 40 seconds

iii) Not more than 12 holes shall be loaded and shot at one time if cap and fuse are used to detonate the charge.

MUDCAP BLASTING:

iv) Mud cap blasting being inefficient and dangers should be avoided. To or more mud caps shall not be placed on one rock except when electrically detonated.

e) FIRING:

i) Shots shall, so far as practicable, be fired electrically and only apparatus especially designed for the purpose shall be used. No shot shall be fired except by a licenciate blaster authorised by the engineer-in-charge.

ii) The charge should be fired, successively and not simultaneously.

iii) Prior to the firing of a shot, all persons in the blasting area shall be warned of the blast and ordered to a safe distance from the area.

iv) Competent flagmen, equipped with red flags and whistles shall be posted to stop traffic at access points, on each possible route of travel, to the vicinity of the blasting area. Blasting shall be done at fixed hours and the blasting times shall be displayed on a Notice Board.

v) Blasts shall not be fired until it is absolutely certain that every person has retreated to a safe distance.

vi) The person-in-charge of blasting shall be last one to leave the area to be blasted.

vii) The signal to fire shall be given only by the person-in-charge of the blasting.

viii) A loud pre-arranged, warning signal shall be given at a proper time before firing a blast and all clear signal shall be given when the blasting is over.

ix) Definite places of shelter, natural or artificially constructed, shall be assigned to the crew. Workers should be made to go to these shelters rather than trust each other's judgement about a safe place.

f) INSPECTION AFTER BLASTING (MISFIRE DRILL):

i) Immediately after a blast has been fired, the firing line shall be disconnected from the blasting machine or other source of power.

ii) After a blast has been fired, a careful inspection should be made by the blaster to determine if all charges have been exploded. The blaster shall count the number of the exploding shots in blasting. Misfires in fuse blasting shall not be examined for at least 10 hours after its failure to explode. Electric blasting misfires shall not be examined for at least 15 minutes after failure to explode. Other persons shall not be allowed to return to the area of blast until and "All Clear" signal is given.

iii) All wires shall be carefully traced and search made for any exploded cartidges by the person-in-charge of the blasting operation.

iv) Loose pieces of rock and other debris shall be sealed down from the sides of the face of excavation and the area made safe before proceeding with the work.

MISFIRES:

v) Misfired holes should be placed in the charge of a competent person.

If broken wires, faulty connections, or short circuits are determined as the cause of a misfire, the proper repairs shall be made, the firing line reconnected, and the charge fired. This shall be done, however, only after a careful inspection has been made of burdens remaining in such holes and no hole shall be so fired when the burden has been dangerously weakened by other shots.

viii) The charge of explosives from a misfired hole shall not be drilled, bored or picked out.

ix) Misfired charges tamped with solid material shall be detonated by the following method:

a) Float out the stemming by use of a water or air jet from hose until hole has been opened to within 90 cm of charge;

b) Water shall be siphoned off or pumped out;

c) New charge shall be placed and detonated.

Whenever this method is not practicable, then a new hole not nearer than 90cms should be drilled, loaded and detonated. A careful search shall be made of unexploded material in the debris of the second stage.

3.7 TUNNEL AND SHAFT BLASTING:

i) Only electric blasting shall be adopted for shaft and tunnel work.

ii) A separate circuit independent of power and light circuits shall be used for blasting.

iii) No electrically energised circuit shall be installed on the same side of the shaft or tunnel with the blasting circuits.

iv) All electric lights or other energised circuits shall be disconnected for at least 200 ft. from the point of loading.

v) All tracks, airlines and vent pipes shall be kept properly grounded.

vi) For loading purposes the employees shall be equipped with permissible battery lamps.

vii) Switches shall be as specified in para 3.5 C (ix). The safety switch and the firing switch shall be placed on opposite sides of the tunnel.

viii) Only explosives, which produce less than 0.005 cum of poisonous gas-(carbon monoxide and hydrogen sulphide) per 1/1/4" x 8" cartridge shall be used for shaft and tunnel work.

ix) No fire, flame, smoking or open lights shall be allowed within 6 metres from any explosive except for the purpose of firing a charge.

x) Adequate warning notices shall be given to all persons at the time of firing and it shall be the duty of every employer to provide adequate shelters or screens for protection of workers exposed to risk of injury from the explosion or from flying material.

xi) There shall be kept by the employer or his agent a register of explosives in which particulars of all issues and returns, particulars or explosives used in each blasting operation and particulars of misfired shots shall be entered.

CHAPTER 4

CONSTRUCTION

4.1 SCAFFOLDS:

4.1.1 Scaffolds of proper type shall be provided for all work that cannot be done from the ground or from part of a permanent structure or from a ladder or other available means of support and safe means of access shall be provided to every place at which workers are required to work.

4.1.2 Every scaffold and every part thereof including supports shall be of good construction, of suitable and sound material and of adequate strength for the purpose of which it is used and it shall be properly maintained. Construction and dismantling of every scaffold shall be under the supervision of a competent person. Boards and planks used for the floors shall be of uniform thickness, butt jointed, closely laid, and securely fastened in place.

4.1.3 Every scaffold shall be securely supported or suspended and shall, where necessary be sufficiently and properly strutted or braced to ensure stability. The use of cross braces or framework, as means of access to the working surface shall not be permitted.

4.1.4 All scaffolds or working platforms of any nature shall be securely fastened to the building or structure, or if independent of the building shall be braced or guyed to prevent sway.

4.1.5 In the construction of dams sufficient anchorage shall be provided in the dam itself at the time of construction. The projecting anchorage shall be cut off only on completion. It is safer to avoid support on the sloping runners. The points should be provided with bolts and nuts and not bent rods.

4.1.6 SUSPENDED SCAFFOLDS:

i) Outriggers or other means of supports of suspended scaffolds shall be of adequate length and strength, (not more than 2m length unless specified by the Engineer-in-Charge) properly constructed, installed and securely fixed by anchor bolts or other equivalent means.

ii) Ropes chains, or other means of suspension shall be of good construction, sound material, adequate strength and free from patent defects and properly secured. The ropes and chains shall have a factor of safety of 8.

iii) The platform shall not be less than 45 cms wide and points of suspension not more than 3 metres apart and so arranged or secured that at the working position the edge is as close as practicable to the working face when persons have to work in a sitting position.

iv) All rolling scaffolds shall be equipped with a positive locking device to prevent accidental movement of the scaffolds. These shall be periodically tested.

v) Suspended scaffolds shall be tested as frequently as may be necessary to ensure that minimum safety factors are maintained. The test will be made by raising the working surface 30 cms above the ground and loading it with at least three times the maximum weight that will be imposed upon it.

4.1.7 Skips, buckets, baskets and similar equipment shall only be used for work of short duration when use of suspended scaffold is unreasonable and shall be used under the supervision of a responsible person. The skip, bucket or basket shall be at least 75 cm deep.

4.1.8 Trestle scaffolds shall not be of more than three tiers and the working platform shall not be more than 4.5 metres above the ground or floor or other surface upon which the scaffold is erected, and no trestle scaffold shall be erected on a suspended scaffold.

4.1.9 Men shall not be allowed to work from scaffolds during storms or high winds.

4.1.10 If scaffolds are to be used to a great extent or for a long period of time, a regular plank stairway, wide enough to allow two people to pass, shall be erected. Such stairways shall have hand rails on both sides.

4.1.11 When work is being performed above a scaffold platform a protective overhead covering shall be provided for the men working on the scaffold.

4.1.12 Whenever workmen have to work or constantly pass under a scaffold on which men are working a screen or other protection shall be provided to catch any falling material. Such protection shall extend outside the scaffold properly in order to catch any material falling off the edges of scaffold platforms. 12 mm wire mesh netting of No. 18 gauge or better may be used for this purpose.

4.1.13 Side screens shall be provided on scaffolds erected along passageways or other thorough fares.

4.1.14 On high scaffolds a netting or equivalent guard shall be provided for the space between toe-boards and railings.

4.1.15 During dismantling of scaffolds necessary precautions shall be taken to prevent injury to persons due to fall of loose materials, bracings and other members of the scaffold shall not be removed prematurely while dismantling, the entire scaffold shall be maintained stable and rigid so as to

avoid the danger of collapse. Nails from the planking and various members of the scaffold shall be carefully removed and all material carefully piled.

BALLI STAGINGS:

4.1.16 These stagings used upto a height of 12 metres shall be designed and erected with adequate bracings securely fastened under the supervision of an experienced and competent person and shall be regularly inspected and properly maintained.

4.2 PLATFORMS, GANGWAYS AND RUNS:

4.2.1 All working platforms, gangways and runs from which workers are liable to fall more than 2 metres shall be:

a) Of adequate width depending upon the type of work done and closely boarded, planked or plated. For platforms the width shall not be less than 90cms. For gangways and runs the minimum width shall be 45 cms but when such gangways or runs are used for passage of materials the width shall not be less than 90cms.

b) Provided with suitable guard rails of adequate strength to a height of 1 metre above the working surface and toe-boards of at least 20 cms in height to prevent fall of persons, materials or tools.

4.2.2 Every platform gangway run or stairs shall be kept free from any unnecessary obstruction, material or rubbish and from any projecting rails, and when they become slippery appropriate steps shall be taken by way of sanding, cleaning or otherwise to remedy the defect

. Each supporting member used in the construction of runways, platforms, ramps and scaffolds shall be securely fastened and braced. The supporting member shall be placed on a firm, rigid, smooth foundation of nature that will prevent lateral displacement. The thrust-out members from which a scaffold is suspended shall be sufficiently strong and shall extend at least 30 cms outside the platform being suspended and have a stop block or bolt at the outer end.

PLATFORMS:

4.2.3 The minimum uniformly distributed design load per sq. metre of platforms shall be 300 kgs. In case of stone masonry it shall be 450 kg per sq. metre. Any concentrated load at any point in the span shall not exceed the designed uniformly distributed load. A factor of safety of 4 shall be adopted. Planking shall not be less than 30 mm thick.

4.2.4 A scaffold platform plank shall not project beyond its end-supports to a distance exceeding four times the thickness of the plank unless it is effectively secured to prevent tipping.

4.2.5 Cantilever of scaffold planks shall be avoided. Ledgers or putlogs should be erected to support the ends of such planks.

4.2.6 Where planks are butt jointed, two parallel putlogs must be used, not more than 10 cms apart, giving each plank sufficient support.

4.2.7 The following minimum widths of platforms for various types of scaffolds are recommended:

a) Where platform is not more than 2 metres above the ground or solid floor:
   i) For painters, decorators and similar work men…….30 cms
   ii) For other types (Men and Tools only)……50 cms

b) Where platform is more than 2 metres above the ground or solid floor;

   i) For men, tools & materials …….120 cms
   ii) For men, tools, material & vehicles ……150 cms

GANGWAYS AND RUNS:

4.2.8 All planks forming a gangway or run shall be so fixed and supported as to prevent undue or unequal sagging.

4.2.9 No gangway or run the slope of which exceeds 1 vertical to $1^1/_2$ horizontal shall be used.

4.2.10 Where the slope of a gangway or run renders additional foot-hold necessary, and in every case where the slope is more than 1 vertical to 4 horizontal, there shall be provided proper stepping laths which shall:

i) be placed at suitable intervals, and

ii) be of the full width of the gangway or run except that they may be interrupted over a width of not more than 10 cms to facilitate the movement of borrows.

4.3 LADDERS:

4.3.1 Every ladder and step-ladder shall be of good construction, sound material and adequate strength. These shall be inspected at least one a fortnight and observations recorded.

a) No ladder with defective or missing rung or with any rung which depends for its support solely on nails, spikes or other similar fixing shall be used.
b) Wooden ladders should not be pained as point covers up defects but linseed oil or clear varnish should be used.

4.3.2 The use of ladders for other than a means, of access should be eliminated as far as possible.

4.3.3 Whenever a platform is 1-5 meters or more above the ground, a ladder or stairway shall be provided, one for each successive platform. Safe access from and to ladders or stairs must be provided at all platforms.

4.3.4 Every ladder used for a vertical height of more than 9 metres shall be provided with an intermediate landing and vertical distance between two successive landing places shall not exceed 9 metres. All intermediate landings shall be provided with suitable guard rails to a height of at least 1 metre above the landing place.

4.3.5 Where a ladder is used as a means of communication or as a working place the ladder shall rise, or adequate hand-hold shall be provided, to a height of at least 1 metre above the place of landing of the highest rung to be reached by the feet of any person working on the ladder, as the case may be, or if that is not possible to the greatest practicable height.

4.3.6 When using a ladder or a step ladder, the user should always face the ladder. The transportation of materials by ladders should be reduced to the minimum. Tools and materials should wherever practicable, be pulled up with a rope.

4.3.7 Ladders should not be placed in front of doors opening towards the ladders or against window sashes. Stepladders should be opened out fully before use. Two ladders should be spliced together to provide access to a greater height than when a single ladder is used.

4.3.8 When permanent or portable ladders are used, the upper ends shall extend 110 cms above the platform. Portable ladders shall be securely fastened at the bottom and top.

4.3.9 All ladders shall be periodically inspected. The stability of ladders should be tested before using it.

4.3.10 A ladder should not be placed upon a box, barrel or other movable insecure object.

4.3.11 Portable ladders should be in a safe position before being climbed. The slipping of a ladder at either end should be carefully guarded against, especially where the supporting surfaces are smooth or vibrating. If necessary, a person shall be stationed at the base of the ladder to prevent it from slipping.

4.4 OPENING, DANGEROUS CORNERS, BREAKS OR EDGES & SLOPPING SURFACES:

4.4.1 Every accessible opening through which any person is liable to fall a depth of more than 12 metres or to fall into any liquid or material so as to involve risk of drowning or of serious injury shall be provided with guard rails 1 metre above the edge and toe boards at least 20 cms high or a covering to prevent fall of persons, tools or materials through the opening.

4.4.2 Every dangerous corner, break or a edge or any structure which is accessible to any person shall be provided with guard rails of adequate strength and, if necessary, with the toe boards.

4.4.3 Any person employed on a sloping surface of a vertical fall of more than 2 metres shall be provided with suitable ladders or crawling boards properly secured and a suitable working platform fitted with suitable guard rails and in case it is impracticable or inappropriate to provide such ladders, crawling boards or working platforms, suitable safety belt of sound material and in good condition with a rope of adequate strength and length enabling the wearer to attach himself to a secure anchorage shall be supplied, or where the wearer cannot so attach himself, a second person shall attach or hold the rope in a secure manner.

4.5 FORM CONSTRUCTION AND CONCRETE PLACEMENT:

FORM CONSTRUCTIONS:

4.5.1 Safety hazards in form-work construction such as those due to poor housekeeping, leaving materials and tools where they may fall and cause injuries; the tops of forms used as walkways not equipped with standard guardrails and toe-boards on the open side, and failure to properly secure form of scaffolds can be reduced, if not eliminated, by carefully planning.

HANDLING FORMS:

4.5.2 All forms or form panels that are to be used or reused should have U-bolts, sufficient in number and size, to carry the weight of forms or form panels. All temporary bracing shall be securely fastened to prevent members from falling where panels are being moved.

RAISING:

a) All Form-raising operations should be conducted in a safe and orderly manner and only experienced workmen should be allowed on this type of work. All form raisers shall use safety belts when required to go over the side unless scaffolds are in place on the form.

b) 'A' frames shall be designed and maintained to withstand all loads imposed upon them. All head and tail jacks shall be maintained in good working order. Tail jack fasteners of sufficient length and size shall be securely anchored in the concrete.

STRIPPING;

a) All form stripping shall be conducted in a safe and orderly manner and in accordance with the rules for good housekeeping. All stripped lumber shall be placed in piles or removed immediately from the work area. All protruding nails or superfluous bolts or studs used to fasten the shuttering shall be cut or bent down soon after the stripping.

b) Boatswain's chairs, safety belts, and ropes shall be used where workmen are exposed to falling hazards of such stripping operations and shall be protected from falling objects.

CONCRETE PLACEMENT:

4.5.3 All employees placing concrete should wear hard hats and rubber boots with trouser legs outside. Shirt sleeves should be rolled down, gloves should be worn, and every reasonable precaution taken to keep cement and concrete off the skin. Provision should be made for concrete workers to take a shower before leaving the jobs at the end of their shift.

a) The water in freshly mixed concrete contains lime and alkalis and may cause severe and painful damage to skin and eyes. Such contacts should be avoided by proper protective clothing, boots, gloves, goggles etc. If they should occur, the workman should immediately remove liquids of substances by washing in water.

b) Cement and concrete when dumped or dropped splashes like water and this is another way the burning lime and alkalis can get into unprotected eyes.

4.5.4 Men in good physical condition should be employed to operate vibrators. Lowering of vibrators from one level to another by use of air hose or electric cable shall not be permitted.

4.5.5 When concrete is transported by means of chutes, the towers shall be of substantial construction, sound material and ample strength to carry the greatest load that could possibly occur. They shall be properly guyed and provided with safe access. At each level of the chute where men work, landing platforms shall be provided and the chute shall be properly guyed and the area below the spout shall be barricaded when practicable to keep people out of the areas where they might be injured by falling concrete.

CONCRETE BUCKETS:

4.5.6 Concrete buckets for use with cranes and cable ways shall be constructed without flanges or other projections that may collect concrete which might be dislodged and fall on workmen. Buckets shall have an air connection to operate the dumping mechanism. All concrete buckets that are dumped by control of a cableway operator shall be equipped with safety catches that must be manually released before the concrete can be dumped. No man shall ride a bucket for any purpose.

4.5.7 When it is necessary to drift a bucket to a place not accessible by the crane, the drifting shall be done by some mechanical means and not by men pushing or pulling the bucket. Drifting the bucket by swinging the crane shall be prohibited.

4.5.8 Only those workmen who are known to be careful and reliable should be employed as signalmen to direct the spotting of buckets. Signalmen should be so stationed in a safe place, that they can see the entire area where concrete is being placed. A man should be specially designated to watch the movement of the bucket and warn the crew and vibrator operators of the approaching bucket so that all workers may clear out of the area affected by the bucket.

4.5.8 a) Workman/inspectors shall not enter a bin containing cement sand, aggregates unless wearing a safety belt with life line attached and attended by another worker who will pay out and keep minimum slack in the line at all times.

MIXER:

4.5.9 All mixer gears, chains and rollers shall be guarded. If the mixer has a charging skip, it shall be guarded by bars on the sides to prevent any one walking under the skip. The cable and sheaves should be inspected daily when the mixer is in continuous daily operation. When it is necessary to get inside mixers for cleaning, repairs or inspection, the control switches shall be locked and notice to the effect pasted on it to prevent inadvertent starting of the mixer.

MIXING PLANT:

4.5.10 Mixing plants shall be adequately designed and precautions taken to protect workmen from falling objects. Walkways, platforms, stairways and ramps shall be well built and protected. The operations of the plant shall be co-ordinated by signals or interlocking devices as may be necessary to ensure the safety of all workmen. An air exhaust system shall be installed to remove cement and other dusts from the inside of the plant. Respirators should be worn when necessary.

PUMP CRETE:

4.5.11 (a) The scaffolding supporting the pipe shall be designed to carry the pipe when filled with concrete plus 100 percent overload, plus the estimated weight of the maximum number of workmen that may use the scaffold at the same time while the pump is operating. A factor of safety of four shall then be used.

b) The pipe line shall be anchored at all curves and near the end. The toggle and flange connections shall be inspected before each placement to ensure tight joints. Air release valves shall be installed at high points to release entrapped air. The use of these valves will assist in preventing line plugging which in turn reduce accident possibilities.

c) The work of cleaning a pipe line must be carefully done. Experienced workmen should be employed. There is danger of injury to workmen and also possibility of wrecking the scaffold. If and when necessary to open a pipe to clear it of an obstruction, the work must be carefully done in order that workmen may not be injured by concrete blown out by air pressure in the pipe.

d) All workmen, when working in the vicinity of a pump crete machine should be provided with goggles and be required to wear them.

SAND BLASTING:

4.5.12 If sand and air blast are used, the sand blaster shall wear the regulation sand blaster's hood. If sand and water blast are used, operators of the blast shall wear goggles and protective clothing, operators of sand blast machines shall use care in directing the blast so that no one is caught in the blast or the rebound. All employees whose work requires that they be in the vicinity of the sand blasting operations shall wear goggles and respirators if a dry sand blast be used.

RE-INFORCEMENT:

4.5.13 Reinforcing steel shall be piled on wood sills, and segregated as to sizes and lengths. Wood stakes shall be used to separate the various piles. Lanes and driveways shall be kept clear.

a) The main accident hazards in bending reinforcing steel are due to sharp burrs in cutting and the whipping of long flexible rods. Tripping hazards will be present unless the rules of good house keeping are observed. Employees on this work should wear heavy gloves or hand pads. A leather or heavy denim apron is desirable. The area about the bender shall be kept clear for a distance equal to the length of the longest bar.

b) All persons placing reinforcement steel where a falling hazard is present shall use safety belts. The tie-off rope may be short with a hook on the end to engage the steel. The common practice of a carrying wire for ties in a coil over one shoulder and under the opposite arm introduces hazards that can be obviated by carrying the wire on a reel that is worn on the belt.

CEMENT HANDLING:

4.5.14 Workmen engaged in handling bulk cement in confined places should wear tight-fitting goggles, approved respirators and protective clothing that fits snugly around the neck, wrists and ankles.

4.5.15 Workmen should be instructed to ensure personal cleanliness to guard against cement dermatitis and should be advised to report any susceptibility cement burns, Hand cream or petroleum jelly shall be provided for the use and protection of men handling cement.

4.6 GROUTING, GUNTIING & SHOTCRETING:

4.6.1 Many of the hazards of grouting, guniting and Shotcreting operations are common to other construction operations, and are, therefore, covered by the above provisions, however, some of the principal hazards particularly incident to grouting and guniting are as given below:
MACHINERY HAZARDS:

4.6.2 All openings of grout mixers shall be adequately guarded. All flywheels, and all other moving parts including compressors drive belts, shall likewise be fully guarded.
GROUT PIPE AND HOSES:

4.6.3 All pipes or hoses used to convey the grout shall be of sufficient strength conforming to standard specifications to withstand the maximum pressures that may be reached during the operation. Pumps shall not be operated at pressures in excess of their rated capacities, or the safe working strength of the conveying system. All hose couplings shall be of standard types, and makeshift wire connections shall not be used. Pipes or hose laid along ladder ways catwalks, or ramps, shall be located at one side of the travelway in order to prevent tripping hazards.
TOOLS:

4.6.4 Proper tools for the work to be done shall always be provided and maintained in good condition. Only wrenches with jaws in proper condition shall be used. In using a wrench it should always be so placed that the pull tends to force the jaws further on the nut, and the user should make sure that his footing is secure before applying force to be wrench.
SAFETY BOLTS:

4.6.5 Men working in elevated position shall use suitable safety belts, boatswains chairs, or lines to guard against falling.
GALLERY LIGHTING AND VENTILATION:

4.6.6 All galleries or shafts, where foundation grouting is in progress, shall be adequately lighted and ventilated and reasonably free from water. Workmen should be provided with pocket flashlights for use in case the light circuit falls. All unused shafts, vertical stairwells, or other openings in galleries shall be barricaded.
TELEPHONE SYSTEM:

4.6.7 Wherever feasible, a telephone system should be used to provide positive and quick method of communication between all control locations or grout operations.
GUNITING/SHOTCRETING:

4.6.8 Only experienced men should be employed for guniting and Shotcreting, which is a special type of concrete work. The nozzle men and helper shall be provided with cup type safety goggles, and shall use them as protection against rebound material. The nozzle man should operate the nozzle so as to keep the rebounds at a minimum, and care must be taken not to trap the rebound on cleaning men in the blast.

a) All scaffolds or platforms used in placing gunite shall be substantially built. No makeshift type of construction shall be permitted.
b) All hoses and mixers shall be inspected daily and maintained in a safe working condition.
c) All other workmen shall be excluded from the immediate working area.

4.7 STRUCTURAL STEEL ERECTION:

4.7.1 Heavy members must be maneuvered into places, but the short time required to make the erection joint at any connection does not ordinarily justify the erection of a rigid scaffold. When scaffold and ladders for use of the welders, riveters or erectors are necessary, the safety rules and regulations laid down in the manual should be followed.

4.7.2 All employees working in places where they are exposed to falling hazards should use safety belts.

4.7.3 Wherever workmen are exposed to unusual falling hazards from which it is impracticable to protect them by temporary floors or scaffolds, a safety net should be suspended below the place where men are working. Such nets shall be of 10 cms mesh and shall be made of Manila rope of at least 20mm diameter, with an outside or border rope of 18mm diameter. The border shall be provided with loops so that the nets can be attached to the structure or to each other.

4.7.4 Hardhats should be worn by employees working on or around erection operation and should be worn with chin straps fastened.

4.7.5 Gloves of a suitable type should be worn by all employees when handling steel cables or other rough or sharp edged materials.

4.7.6 Goggles should be worn when grinding, chipping, scrapping, caulking, cutting and heating rivets.

4.7.7 Good footwear should be worn by all employees and the soles should be kept free from mud and grease. Safety toe shoes should be worn at all times.

4.7.8 Workmen should stand in clear when derrick is sorting for shifting steel beams. The signal man and the operator should check to see that all men have cleared out before lifts are made.

4.7.9 Workmen should not stand, walk or work beneath suspended loads.

4.7.10 When guiding a beam, it should be so held that the hands do not get jammed against other objects.

4.7.11 When lifting an object in a group, one person should be designated to give the signal for all to lift or set the object down in unison.

4.7.12 When lifting, legs should be bent, body kept straight and leg muscles used for the lift.

4.7.13 There shall be no riding on steel that is being hoisted, no riding on the overhauling weights, hooks, cables or slings, nor sliding down on ropes or cables.

4.7.14 Public or workers in other trades operating close to steel erectors should be safeguarded at all times.

a) They should be cautioned and instructed on any exposure condition existing or that may arise and result in accident.
b) They should be advised to wear hardhat when required to work close by.
c) They should be instructed not to operate directly underneath scaffolds that are being used.
d) Red flags, or warning signs should be strategically posted to assist in cautioning and instructing others.

4.7.15 When receiving or unloading steel on job site, adequate protection such as barricades, sign flags and watch-man should be provided to protect the public.

4.8 WELDING AND CUTTING:

4.8.1 All welding and cutting shall be done by workmen who are thoroughly trained in the work or by trainees under competent supervision. Shields shall be placed around the work to protect persons from glare.

4.8.2 Welding and cutting shall be not done in the immediate proximity of flammable materials.

4.8.3 Welders and helpers shall wear non-combustible helmets and gloves during welding operations they should be careful to keep out of the line of sparks and hot metal; and they should wear clothing free from grease, gasoline, oil and other flammable materials.

4.8.4 Oxygen and acetylene cylinders or container shall never be permitted in small spaces of compartments where welding operations are in progress.

4.8.5 A helper shall always be at hand to shut off the gas in case of an accident when the welder is working in a space from where escape is difficult.

4.8.6 All welding operations should be carried out in a well-ventilated space. Where any considerable amount of welding is to be done, an exhaust system for carrying away the fumes should be installed. If brass, bronze or zinc is to be welded, a suitable respirator should be worn if exhaust system is not installed.

4.8.7 All torches, regulators, cylinders and other such equipments shall be of an approved design, regularly inspected and kept in good condition. Defective apparatus and equipment shall be removed services, replaced or repaired and re-inspected before again being placed in service. Repairs shall be made only by persons thoroughly familiar with such apparatus.

4.8.8 Welders and helpers shall wear suitable eye-protective devices during welding and cutting operations. Eyes exposed to welding or flashes should be washed with Rose water for better relief.

FIRE PROTECTION:

4.8.9 To avoid fire hazards the following additional precautions should be observed on all oxy-acetylene cutting and welding:

a) Keep hose and cylinder valves free from grease, oil, dust and dirt.
b) Keep cylinders away from stoves, furnaces and other sources of heat.
c) Only 'Gas Lighter' be used to light the torch.
d) Avoid use of oxy-acetylene flame in confined spaces.
e) Clean thoroughly with steam all containers that have been used for storage of flammable liquids, or wash with hot water and soda, and ventilate thoroughly before welding and cutting.
f) When testing for leaks use only soap water and watch for bubbles.

g) Valve protection caps shall be in place when cylinders are not in use.
h) All employees shall be made familiar with the location and proper use of fire extinguishers in their area of work.

GAS CYLINDERS:

Due care shall be taken while loading and unloading oxygen/acetylene gas cylinders.

4.8.10 Gas cylinders shall be kept up right in approved safe places where they cannot be knocked over, and well separated from radiators, furnaces and combustible materials. These safe places shall be painted with appropriate warning signs. Empty cylinders should be marked "EMPTY' and the valves closed. Loaded and empty cylinders should be kept in separate places.

4.8.11 Oxygen cylinders shall not be stored in close proximity to acetylene cylinders or other fuel gas inside the building and in no circumstances either oxygen or acetylene cylinders shall be stored under direct rays of sun or in places where excessive rise of temperature is likely to occur.

4.8.12 Tempering with or attempting to repair safety devices or valves of gas cylinders shall be prohibited and if trouble is experienced in any cylinder, a report shall be sent to the supplier forthwith describing the character of the trouble and particulars of the cylinder.

4.8.13 When acetylene cylinders are coupled, approved flash arrestors shall be inserted between each cylinder and the coupler block or between the coupler block and the regulator and only cylinder of approximately equal capacity shall be coupled.

4.8.14 Cylinders found to have leaky valves or fittings which the closing of the valve will not stop shall be taken into the open way from any source of ignition, and slowly drained of gas.

4.8.15 Electric magnets or direct slings shall not be used for handling cylinders and only special cradles shall be used.

HOSES AND TORCHES

4.8.16 The hose shall be specially designed for use on cutting and welding operations. Special care shall be taken to avoid interchange of oxygen and acetylene hoses, as the mixture of these gases is highly explosive. Some coloured code should always be used on each gas-red for fuel gas and black for oxygen. Glycerine shall be used for lubricating valves.

4.8.17 Some manufactures dust the inside of the hoses with fine talc, new hoses shall, therefore, be thoroughly cleaned on the interior before attaching to the torch. Compressed air shall never be used to clean hoses as it may contain oil from the compressor. Oxygen shall be used to clean oxygen hoses and acetylene shall be used to clean acetylene hoses.

4.8.18 Torches that leak at any connection get hot, or flash black shall not be used. Copper or brass wire shall be used to clean the tips. Hardwood sticks may also be used.

GAS WELDING AND CUTTING OPERATIONS:

4.8.19 The gas cylinders shall not be used unless fitted with the following: high pressure gauge on cylinder, reducing valve with pressure regulator and safety relief device, low pressure gauge for indicating pressure on the torch. The fuel gas and oxygen cylinder shall have left hand and right hand threads respectively so, that they cannot be interchanged.

4.8.20 Cylinder valves shall be opened only with hand wheels or tools, specially designed for that purpose and left in place while cylinders are in use. Cylinder valves shall be closed when not in use.

4.8.21 Since an explosion may occur oxygen/acetylene gas cylinders and fittings shall be kept away from oily or greasy substance and shall not be handled with oily hands or gloves. A jet of oxygen shall not be directed at oil surfaces, greasy clothes, or within a fuel oil other storage tank or vessel.

4.8.22 Under no circumstances shall acetylene be used at a pressure exceeding 1.1 kg per sq. cm. Oxygen pressure should always be such that acetylene does not flow back into the oxygen cylinder, as oxy-acetylene mixture is highly explosives.

4.8.23 After attaching the regulator and before opening the cylinder valve, the operator should see that the adjusting screw of the regulator is released. Oxygen should not be permitted to enter the regulator suddenly. The cylinder valve should be opened slowly.

4.8.24 Oxygen and acetylene hoses shall be tapped or clamped together at 1 meter intervals. Tape shall never be used to make repairs to hoses.

4.8.25 Oxygen or acetylene cylinders shall never be placed where they can be contacted by electric wires or with ground wires of electrical equipment. If electric arc welding is being done in the same vicinity, such precautions as necessary must be observed to make sure that the oxygen-acetylene gas equipment does not come in contract with electric are welding equipment.

4.8.26 Closed tanks or containers shall never be welded until they are thoroughly cleaned, dried out and ventilated and it has been determined that they contain no explosive or harmful fumes.

4.8.27 No smoking shall be permitted by workmen or welders, while handling gas cylinders.

ELECTRIC ARC WELDING AND CUTTING:

4.8.28 The flash from electric are welding is much more severe than that from oxy-acetylene welding, therefore, the welder shall have adequate eye protection and all persons working in the immediate vicinity should wear suitable coloured goggles unless the work is completely shielded.

4.8.29 Welding shall not be done in the presence of any person not amply protected from the flash. Persons should never look at an electric are with the naked eye; to do so may cause serious eye injury.

4.8.30 Only heavy-duty electric cable with unbroken insulation shall be used, and all connections shall be water-proof. All connections shall be checked before welding is started, and frequent inspection shall be made during welding operations.

4.8.31 When it is necessary to couple several lengths of cable for use as a welding circuit and occasional coupling or uncoupling is necessary, insulated cable connectors shall be used on both the ground line and electrode holder line.

4.8.32 Frames of all electric welding machines operated from power circuits shall be effectively grounded.

4.8.33 When the operator has occasion to leave his work or stop work for any appreciable time, the power supply switch in the equipment should be opened and the unit shut down.

4.9 PAINTING:

4.9.1 Packages containing paints, varnishes, lacquers or other volatile painting materials shall be kept tightly closed when not in actual use, and shall be placed where they will not be exposed to excessive heat, sparks, flame, or direct rays of the sun.

FIRE HAZARD:

4.9.2 Most paint materials are highly combustible, and every precaution should be taken to eliminate danger from fire.

(a) No attempt should be made to heat paint materials except by placing containers in air, or water at moderate temperature. Dirty wiping rags, paint scrapings and paint saturated debris, which always involve the hazard of spontaneous combustion or ignition from other sources, should not be allowed to accumulate but should be collected and disposed of at frequent intervals.

(b) Smoking, open flame, exposed heating elements, and other source of ignition of any kind should not be permitted in paint stores or area where spray painting is done.

(c) Fire extinguishers of appropriate capacity shall always be at hand where flammable paint materials are being mixed, used or stored. Sandpails or extinguishers of the carbon dioxide and carbon tetrachloride type are generally effective.

PROTECTION FROM DUST AND FUMES:

4.9.3 Apart from its explosiveness, air laden with dust or fumes may cause suffocation or other respiratory injury and may also have toxic effects through the skin or alimentary system. In painting, the dust comes chiefly from operations preparatory to painting such as sand blasting, scaling, scraping and brushing. Injurious fumes are given off when volatile paint materials are being mixed or applied specially when they are sprayed, Dust and fume nuisance is most dangerous in constricted spaces. Coal tar paint fumes are particularly obnoxious.

a) Workmen must be provided with an ample supply of fresh air. If natural circulation is not adequate, artificial ventilation shall be provided. Ventilation shall be sufficient to carry away harmful accumulations of dust and fumes or workmen shall wear approved type respirators.

b) Spray-painting operations shall be so confined as not to contaminate the air where other men are working. Spray gun operators should be required to wear clothing, which fits snugly at the ankles, neck and wrists and should wear gloves, goggles and respirators.

HANDLING PAINT MATERIALS:

4.9.4 Serious harm may result if the skin is exposed to prolonged contact with paint materials. Injury may take the form of burns or toxic effects resulting from absorption into or through the skin. It is well be avoid the use of pain solvents for cleaning the skin. These materials are not only injurious themselves, but they also carry poisonous ingredients of the pain into the pores of the skin. There

area a number of protective creams which may be applied to the skin before exposure to paint substances, and which wash off easily in warm soapsuds, taking paint off with them. The use of protective creams by all painters is recommended.
Food shall never be placed where it might be exposed to fumes or dust from paint. Painters should clean their hands before eating.

CREOSOTE

4.9.5 Creosote is a lumber preservative and is closely related to carbolic acid. Extreme care is required to prevent contact with the skin or eyes, as it will cause severe burns. Protective cream or jellies should be used on exposed skin surface when engaged in handling creosoted materials. Affected parts of the body should be washed immediately, and in most cases the services of a physician should be secured.

CHAPTER 5

PLANT AND MACHINERY

5.1 TOOLS

HAND TOOLS:

5.1.1 All hand tools shall be kept in good conditions and used only for the purpose for which designed.

5.1.2 Tools having mushroomed/heads, spilt or defective handles, worn parts, or other defects that will impair their strength or render them unsafe for use, shall be removed from service and shall not be reissued until the necessary repairs have been made.

5.1.3 All sharp tools shall be kept in sheaths, shields, tool chests, or other containers when not in actual use, to protect the tools, the workers and other persons.

5.1.4 Tools shall not be left on scaffolds, ladders or overhead working spaces when not is use. When work is being performed overhead on scaffolds or ladders, containers shall be used to hold tools and prevent them from failing.

5.1.5 The practice of throwing tools from one location to another, from one employee to another or dropping them to lower levels, shall not be permitted. When it is necessary to pass tools or material under the above conditions, suitable containers and/or ropes shall be used.

5.1.6 Sharp-edged or pointed tools shall be carried in workmen's pockets.

5.1.7 Only non-sparking tools shall be used in location where sources of ignition may cause a fire or explosion.

PNEUMATIC AND POWER TOOLS:

5.1.8 (a) Hand tools and portable power tools should be inspected frequently for worn-out parts and connections. The sudden cessation of operation or the 'Kicking' or 'bucking' or such a tool may cause a serious accident especially when the operator is at an elevation exposed to the danger of falling.

(b) In using heavy tools, it is best to support them where possible from some detached object or support in order to safeguard the operator's feet.

(c) Loose clothings with free ends should be worn by operators of portable electric drills, reamers, etc. Neither should gloves be worn. Smooth overalls should be worn with the jumper tucked in.

(d) All tools should be laid flat when not in use. They should never be kept standing on the nozzle or cutting edge.

PNEUMATIC TOOLS:

5.1.9 Pneumatic tools shall be used only by employees familiar with and properly instructed in their use.

5.1.10 Pneumatic tools shall be kept in good operating condition thoroughly inspected at regular intervals and particular attention given to control and exhaust valves, hose connections, die clips on hammer, and the chucks of reamers and drills.

5.1.11 Safety clips or retainers shall be installed on pneumatic impact tools to prevent dies and tools from being accidentally expelled from the barrel.

5.1.12 Pressure shall be shut off and exhausted from the line before disconnecting the line from any tool or connection.

5.1.13 Safety lashing shall be provided at connection between tool and hose.

5.1.14 Air hose shall be suitable to safely withstand the pressure for which it is intended. Leaking or defective hose shall be removed from service.

5.1.15 Hose shall not be laid over ladders, steps, scaffolds or walkways in such a manner as to create a tripping hazard.

5.1.16 The use of compressed air for blowing direct from hands, face or clothing is prohibited.

POWER TOOLS:

5.1.17 Power actuated tools shall be used only by persons who have been trained and instructed in their safe use.

5.1.18 Such supervision and safeguards as are necessary to prohibit their use by unauthorised persons shall be provided.

5.1.19 In electrically operated tools a three-conductor cord shall be used so that a ground wire may be taken off the tool. Even a slight electric shock may result in a sudden jump on the part of the operator resulting in a bad fall or a severe bump or fracture.

5.1.20 Connecting cord should have oil resistant rubber insulation. Protection against kinking should be provided by the use of the short coiled steel spring or rubber

protecting tube securely fastened in place at the motor end. Care should be taken to see that strain on the wires is not transmitted to the connection at the terminal or binding post.

(i) Never oil an electric motor to excess. This oil may prove harmful to cord insulation.
(ii) When a motor is in storage, coil the card in a free coil, not a around the motor.
(iii) Inspect cord frequently.
(iv) Do not lay cord on oily or chemically saturated floor while the tool is in use.
(v) Never pull on the cord when it is kinked or pinched.
(vi) Do not lower or lift the tools with the cord; use a small rope.
(vii) Do not leave the cord where a car or truck might run over it.

5.1.21 Premature starting of the motor presents a major hazard. Wherever possible, select tools that are equipped with safety devices to guard against this danger.

5.1.22 The use of power actuated tools is prohibited in explosive or flammable atmospheres.

JACKS:

5.1.23 Maximum working load shall be permanently marked on a jack and it shall be provided with a positive stop to prevent over travel unless this is impracticable in which case the jack shall carry a warning that a stop has not been provided. Every jack shall be thoroughly examined at suitable intervals depending upon service conditions.

STORAGE BATTERY:

5.1.24 Care shall be exercised in handling acids.

5.1.25 When preparing electrolyte the acid must be added slowly to the water until the solution has the proper specific gravity. Never bring an open flame near or allow sparks to shower on a storage battery as the gases produced are explosive under certain conditions.

5.1.26 Ordinary baking soda will prevent skin and eye burns, if used with water immediately after contact with the acid or electrolyte. If soda is not available, a weak solution of ammonia or plain clear water can be used.

5.2 DRILLS:

5.2.1 All drilling equipment shall be kept in good working order. Safe handling and lifting methods should be used.

5.2.2 Drills shall be stopped before greasing the machinery or moving parts.

5.2.3 Crown blocks shall be mounted securely and should be inspected frequently for loose connections.

5.2.4 Drillers should be required to block all finished drill holes over 10 cms in diameter before moving to a new location.

5.2.5 When using compressed air drills as well as other compressed air driven equipment the hose connections should be made only after the pressure has been released.

5.2.6 Electrically operated drills and all other electrically driven equipment should be provided with specially insulated power transmission cables with water-proof connections.

5.2.7 The use of gas engine or petrol engine driven drills under ground shall be prohibited. If used on open air work the engine shall be kept in good operating condition, and the operator shall be trained in the use of the tool, including necessary precautions to avoid burns from the engine. The engine shall be stopped while filling the fuel tank.

5.3 ROPES, CHAINS AND SLINGS:

5.3.1 The use of ropes, cables and chains shall be in accordance with the safe usage recommended by the manufacturer.

5.3.2 No chain or rope shall be used unless:

(a) It is of good construction, sound material, adequate strength and free from patent defects.
(b) Safe working load is plainly marked on it or an identification number is marked on it and the safe working load corresponding to this number is entered in a register maintained by the person-in-charge.

CHAINS:

5.3.3 All chains in continuous use shall be inspected once a month. Each chain shall be measured for length at each inspection. If a stretch of 2.7 cms in 1 metre is found, it shall be inspected for cracks. Any link that shows evidence of a crack or cross-section reduction by wear, nicks or cuts shall be removed. The reduced link section shall never be less than two-thirds of the original section.

5.3.4 No chain shall be used which has been broken and mended with a bolt, nor shall the end of the chain be bolted to the chain to form a loop.

5.3.5 Chains shall never be knotted, nor shall they be shortened by twisting the chain.

5.3.6 Before any strain is put on the chain, it shall be inspected to see that all links are

lined up so that the pull is through the long diameter of the link.

5.3.7 All chains except those mentioned below shall be annealed once a year (6 months for 12mm bar chains and below) when in continuous use. This work shall only be attempted by competent men having the proper facilities for such work. The particulars of annealing or heat treatment and tests shall be entered in the register maintained for the purpose. It is recommended that all chains be returned to the manufacturer for annealing. Chains that need not be annealed are:

Bridle chains attached to derricks or masts;

ii) Chains made of malleable cast iron;

iii) Plate link chains;
iv) Chains of Steel; and
v) Pitched chains.

FIBRE ROPES:

5.3.8 Manila, sisal or hemp ropes are commonly used. For all normal use pure manila rope which is hard but pliant should be used. Sisal rope is 2 to 3 times as strong as manila rope, but its fibreare hard and stiff and have a tendency to splinter. Hemp ropes are as strong as manila ropes, but they are more soft.

5.3.9 The weight, breaking strength and safe working strength with a factor of safety of 8 of standard manila rope(3 strand) are given in the table below(The values are only suggestive):

T A B L E 5.1

Diameter (mm)	Weight per feet (kgs)	Strength(Kgs)	
		Breaking	Working
6	0.97	270	35
12	0.110	1200	150
18	0.250	2500	310
25	0.400	4080	510
32	0.625	6100	770
40	0.890	8400	1050
50	1.610	14090	1790
65	2.485	21090	2630
75	3.900	29030	3630

When a table of strengths is not available an approximation of the working strength of rope may be obtained by squaring the numerator of the diameter in eights and multiplying by 13. This gives strengths somewhat lower than those given in the table (e.g. if the dia of rope is 3/4" the dia in eights will be 6/8" and working load will be found to $(6)^2$ x 13 lbs or 468 lbs).

5.3.10 Fibre ropes should be regularly inspected for wear and tear while in use to make sure that they are in good condition.

5.3.11 Fibre ropes should be protected from abrasion by padding when drawn over square corners or sharp rough surfaces. Frozen rope or wet rope subjected to acids or excessive heat should not be used. Ropes having dark or pinkish brown colouration on them due to exposure to acids shall not be used.

5.3.12 Suitable care should be taken while uncoiling, using and storing the fibre ropes. Sheaves should have a diameter not less than 36 times the diameter of the rope.

WIRE ROPES

5.3.13 Wire ropes have almost superseded fibre ropes and chains for hoisting and haulage purposes.

(a) Standard hoisting rope consists of 6 by 19 wire strands and a fibre core made of iron, cast steel mild plow steel, plow steel or special plow steel.

(b) The breaking strength of standard wire hoisting rope is shown in the following tabulation (The values are only suggestive):

TABLE 5.2

Breaking Strength (Tons)

(*Factor of Safety=8 for working out safe working strengths)

Dia (mm)	Weight (kg/m	Iron	Cast Steel	Mild Plow	Plow Steel	Special Plow

	)		l	Stee l	l	Steel
1	**2**	**3**	**4**	**5**	**6**	**7**
6	0.115	-	2.1	2.3	2.5	2.9
10	0.36	2.05	-	-	-	-
12.5	0.90	3.57	7.7	8.5	9.4	10.8
25	2.40	13.70	29.5	33.0	36.5	42.0
37.5	5.40	29.70	65	72.5	80.5	92.5
50	9.90	51.80	114	127.0	140.0	161.0

(c) Extra flexible hoisting rope, for use with smaller sheaves and drums, such as are usually found in derricks, consists of 8 by 19 wire stands and one fibre core. The breaking strength of this rope is approximately 87 per cent of the standard wire hoisting rope given in the preceding tabulation.

(d) Special flexible hoisting rope consists of 6 by 37 wire stands and one fibre core. It is extremely flexible and is specially adapted to high-speed service on cranes or where sheaves are small. The breaking strength of special flexible hoisting rope is approximately the same as that of standard wire hoisting rope.

5.3.14 Wire rope or cables shall be inspected by a competent person at the time of installation and once each week thereafter when in use.

5.3.15 No wire shall be used in hoisting or lowering if in any length of 8 diameters the total number of visible broken wires exceeds 10 per cent of the total number of wires or the rope shows signs of excessive wear, corrosion or other defect which in the opinion of the person who inspects it renders it unfit for use.

5.3.16 Wire rope removed from service shall be plainly marked or identified as being unfit for further use on cranes, hoists or other load carrying service and stored separately.

5.3.17 Wire ropes should be carefully uncoiled; coiled or used to prevent kinking; kinked strands damage the rope permanently. Even slight burning of rope reduces its load capacity because of drying out of lubrication.

5.3.18 Thimbles of proper size should always he used when a loop is formed at the end of a wire rope.

5.3.19 Socketing, splicing and seizing of cables shall be performed by qualified persons.

5.3.20 Connections, fittings, fastenings, parts etc. used in connection with ropes and cables shall be of good quality and of proper size and strength and shall be installed in accordance with recommendations of the manufacturer.

5.3.21 Drum sheaves and pulleys shall be smooth and free from surface defect such as cracks, kinks, destrands etc. Drums, sheaves or pulleys having eccentric bores or cracked hubs, spokes or flanges shall be removed from service.

5.3.22 The ratio between rope diameter and sheave diameter should never be less than 27. Good practice favours a ratio of 45. Grooves of sheaves or drums should be 2mm larger than nominal rope diameter.

5.3.23 Running lines of hoisting equipment located within 2 metres of the ground or working level shall be boxed off or otherwise guarded, the operating area restricted.

5.3.24 Hooks, shakles, rings and pad eyes, U Bolts and other fittings shall be of proper size and those showing excessive wear or that have been bent, twisted or otherwise damaged shall be removed from service.

5.3.25 Slings, their fittings and fastenings, when in use shall be inspecting daily by a qualified person for evidence of overloading, excessive wear or damage. Slings found to be defective shall be removed from service.

5.3.26 Slings shall be of proper construction and size for the load to be hoisted. Slings should not be attached to load as to provide an angle of less than 90^0 between sling leg and the horizontal. The efficiency varies with the angle of sling as follows:

TABLE 5.3

Angle (Degree)	Efficiency (Percent)	Angle (Degree)	Efficiency (Percent)

90	100	50	76
80	98	45	71
70	94	40	64
65	91	35	57
90	87	30	50
55	82	5	8.5

5.3.27 Single legged and reeved slings shall be avoided as far as possible except for small or unyielding leads under competent supervision.

5.3.28 Slinging should be done only by a crew trained for the purpose. Accidental over loading out of ignorance is frequently the cause of fatal injuries. For all normal practice 2 or 4 part sling should be used.

5.3.29 Suitable protection shall be provided between the sling and sharp unyielding surfaces of the load to be lifted.

5.3.30 The maintenance, repair and testing of slings shall be done only by qualified persons. Proper storage shall be provided for slings while not in use.

5.4 CONVEYORS AND CABLEWAYS

5.4.1 All conveyors shall be regularly inspected, repair and maintained.

BELT CONVEYORS:

5.4.2 Belt conveyors shall not be overloaded to the point where material fall of the belt. The walkway along the belts shall be kept free of materials. Where the walkway is one metre or more above the ground, a standard guard rail shall be installed.

5.4.3 Oilers shall never attempt to clean rollers while the belt is in motion. All oil and grease cups shall be so located that the oiler can service the cups without exposing himself to danger.

5.4.4 The following are the maximum allowable speeds of conveyor belts carrying sand, gravel and earth:

TABLE 5.4

Width of Belt Cms	SPEED (Mtrs per minute)
40 or less	80
40 to 90	130
90 or more	180

If the materials includes abrasive lumps such as crushed rock, the speed should be reduced by 15 metres per minute on narrow belts and by 30 metres per minute on wide belts of 90cms or more in width.

5.4.5 Where trippers are used to control the discharge from belt, a device for throwing the propelling mechanism into neutral gear shall be installed at each end of the runway.

5.4.6 Whenever the belt crosses over a travelled way, either public or private, trays shall be installed to catch all spillage from the belt. The trays and their supports shall be of ample strength to support a heaped load of wet materials and estimated weight of the cleaning crew. The trays shall not be so allowed to fill and patrolmen shall be particularly alert to prevent any spillage on travel ways.

5.4.7 Crossovers or underpasses with proper safeguards shall be provided for passage over or under all conveyors as necessary. Crossing over or under conveyors except where safe passageways are provided is prohibited.

5.4.8 All conveyor systems shall be equipped with such emergency signal devices that will provide reasonable safe control at all times. A system of signals to indicate the stopping or starting of belt shall be installed.

5.4.9 On all conveyors where reversing or runaway presents a hazards "anti-runaway" or "backup" stops or other safeguards shall be installed to protect persons and property from injury and damage.

5.4.10 Riding on conveyors shall be prohibited.

5.4.11 Baffles shall be placed across belts installed on steep grades to prevent material from rolling or bouncing off. The baffles shall be placed at intervals of about 30 metres on level belts.

5.4.12 Where conveyors are operated in tunnels, pits and similar enclosures, ample room shall be provided to allow safe access way

and operating space for all workmen. Tunnels, pits and similar enclosures shall be provided with adequate drainage, lighting, ventilation and emergency controls including escape ways where it is necessary for person to work in or enter such areas.

5.4.13 All openings to hoppers, chutes, bins etc., shall be protected to prevent unauthorisedentry or persons from stepping or falling into them.

CABLEWAYS:

5.4.14 While all cables shall be carefully inspected everyday special care shall be taken in the inspection of the button line at the buttons, where all grease shall be removed and the cable examined for broken wires and abrasions. Button line failures generally occur at the buttons, due to the impact of the carriers, and abrasion caused by the rebound of the carriers when they strike the buttons. Rubber and steel ferrules should be installed on each end of the buttons as shock absorbers.

5.4.15 Breaking of cable occasionally results in fatalities or serious injuries. Button line failures are some times caused by jamming of the carriers when they are picked up by the carriage, thus putting more strain on the line than it was designed to withstand. On some cableway systems, one end of the button line is anchored to a counter weight, which maintains a constant predetermined tension in the line. Jamming of the carriers causes a lifting of the counterweight. A limit switch can be installed above the normal travel of the counterweight, which will sound an alarm in operator's booth.

5.4.16 In night operations, clearance lights shall be installed on high blocks or other high points under cableway to assist the operator in maintaining proper clearance over such points.

5.4.17 Hoist rope failures are most serious. Regular inspection and recording of all repairs and performance is extremely necessary. Unloading of buckets should be slow so that the cable does not surge. Heavy surges cause hoist rope to twine around main cable and get excessive grinds. Sometimes the rope slips out of the pulley in the fall blocks and strands get severely damaged.

5.4.18 Hoist ropes must be replaced immediately on damage.

5.4.19 Carriers should be of such design that they do not slip.

5.4.20 Where any cableway passes above any place on a site of operation where persons employed habitually work or pass and are liable to be injured by objects falling from such cableway, appropriate screens shall be provided or other steps shall, so far as is reasonably practicable, be taken to protect such persons from being so injured.

5.5 LIGHT EQUIPMENT

WORKING MACHINERY:

5.5.1 Safe means shall be provided for the removal of sawdust, chips and shavings from all woodworking machinery.

5.5.2 A mechanical or electrical power control shall be provided on each machine, in a protected position, to prevent accidental starting and to enable the operator to cut off the power without leaving his position at the point of operation.

5.5.3 Circular ripsaws shall be provided with hood guard, splitter and anti-kick-back device. All circular saws shall be provided with hood guards.

5.5.4 The peripheral length of circular saws and cutters beneath tables shall be guarded or sides of table enclosed.

5.5.5 All planners and jointers shall be guarded and have cylindrical heads with throats in the cylinder.

5.5.6 All swing cut off and radial saws or similar machines, which are drawn across a table shall be equipped with limit stops to prevent the cutting edge of the tool from extending beyond the edge of table.

5.5.7 Band saw bladders shall be fully enclosed except at point of operation.

5.5.8 The use of cracked, bent or otherwise defective parts such as saw blades, cutters and knives is prohibited.

5.5.9 A push stick, block or other safe means shall be used in all close operations on saws, jointers and other machines having high speed cutting edges.

GRINDING WHEELS:

5.5.10 All grinding wheels shall be protected by hoods.

5.5.11 New wheels must to inspected carefully to see that they have not been damaged in transit.

Suspending the wheel and tapping it with a light wooden mallet will reveal any cracks.

5.5.12 New wheels should be carefully fitted on the spindles.

5.5.13 Wheels should be tested frequently for balance and if out of round shall be 'trued-up' by a competent workman. If after being 'trued-up', if a wheel is still out of balance, it shall be discarded for use as a power operated wheel.

5.5.14 Wheels used in wet grinding shall never be left standing in water as the water soaked portion may throw the wheel out of balance.

5.5.15 Wheels designed for hand operation shall never be used on power-operated grinders.

5.5.16 Grinding on the site of the wheel in hazardous and shall not be permitted.

5.5.17 Direct current motors shall not be used for operating grinding wheels unless equipped with some approved device to prevent over speeding if the shunt field circuit should be accidentally broken.

5.5.18 When any person is wholly or mainly employed on a grinding wheel and substantial quantities of dust are given off during grinding, such grinding shall not be performed without a hood or other appliance so constructed, arranged, placed and maintained as substantially to intercept the dust throw off and a duct of adequate size so arranged as to be capable of carrying away the dust by means of a fan or other efficient means.

METAL WORKING MACHINERY:

5.5.19 Lathes, punch presses, shapers, milling machines and other metalworking tools shall be fully shielded or guarded.

5.5.20 Point of operation guards shall never be made inoperative by plugging the switch buttons or otherwise interfering with the operation of the guards.

5.5.21 Chain hoists or other power lifting devices shall be provided to light heave objects to the operating table of the machine.

5.5.22 Cleaning the hands with cutting oil or compound is dangerous and should be prohibited as small particles of metal in the oil may penetrate the skin.

5.5.23 Operators shall never wear gloves, lose clothing, loose sleeves or ties.

5.5.24 Articles made of cellubid or other flammable material shall not be worn.

5.5.25 Every machine shall have a brush conveniently placed for the operator to brush shavings or bits or metal from the machine. The bare hand should never be used for this purpose.

5.5.26 Goggles suitable for the work shall be worn and safety shoes are recommended.

5.6 LIFTING APPLIANCES

GENERAL:

5.6.1 Every lifting appliance and every part thereof including all working gear and all plant or gear used for anchoring or fixing such appliances shall:

(a) be of good mechanical construction, sound material, adequate strength and free from patent defects;

(b) be properly maintained; and

(c) as far as construction permits, be inspected at least once every week by a competent person and a report of the result of inspection entered in a register maintained for the purpose.

5.6.2 Every lifting appliance or part thereof during the course of erection, working or dismantling shall be properly supported and all the fixing and anchoring arrangements shall be adequate and secure.

TRAVELLING:

5.6.3 When lifting appliances with travelling and slewing motions are used, there shall be 2 metres clear distance between any part of the appliance in its extreme position and any guardrails or fencing or other fixtures; provided that if it is impracticable to maintain this distance, all reasonable steps shall be taken to prevent the access of any person to such guardrail, fencing or fixture.

5.6.4 Where minimum clearance of 2 metres from nearby structures is not possible, suitable warnings like peal of gongs should be sounded before crane commences to move.

5.6.5 A minimum distance of 2 metres must be maintained between the boom and all power lines of feeds during the travelling operation of a mobile crane.

5.6.6 Under no circumstances an attempt should be made to raise electric wires by a person other than the employee of the Electricity Department.

PLATFORMS AND CABINS:

5.6.7 Platforms for persons driving or operating the cranes or for signallers shall be provided with safe means of access and the floors of such platforms shall be close planked or plated and be of sufficient area for persons employed thereon.

5.6.8 The driver of every power driven lifting appliance shall be provided with a suitable cabin for protection from the weather and it should be so constructed as to afford ready and safe access to parts of the

lifting appliance in the cabin which required periodic inspections and maintenance and it shall not be so placed that it prevents the driver from having clear and unrestricted view of all lifting operations outside the cabin.

DRUMS AND PULLEYS:

5.6.9 Every chain or rope which terminates at the winding drums of a lifting appliances shall be properly secured thereto and at least two drums of such chains or rope shall remain on the drum in every operation.

5.6.10 Drums or pulleys of lifting appliances shall be of suitable diameter in relation to the sizes of chains or wire ropes used round them.

BREAKES, CONTROLS AND SAFETY DEVICES:

5.6.11 Every crane, crab and winch shall be provided with an efficient brake, or brakes and dogs or pawls or other safety devices which will prevent the fall of the load when suspended, and by which load can be effectively controlled whilst being lowered.

5.6.12 While a load is suspended from a crane, hoist or derrick, the operator shall not leave his position at the control until the load has been lowered to the ground.

5.6.13 Side pulls shall not be made with cranes or derricks. The crane or derrick boom shall be directly over the load to be lifted.

5.6.14 Riding on loads, hooks, hammers, materials hoists, or buckets shall not be permitted. Loads, booms and buckets shall not be swung over the head of the workmen.

CRANES WITH DERRIKING JIBS:

5.6.15 On every crane having a derricking jib there shall be provided and maintained an effective interlocking arrangement of sound construction between the derricking clutch and the pawl sustaining the derricking drum except where:

(a) The hoisting drum and the derricking drum are independently driven;

(b) The mechanism driving the derricking drum is self-looking.

STABILITY:

5.6.16 Mobile lifting appliances shall not be used or soft or uneven surface or on a slope in circumstances in which the stability of appliance is likely to be effected unless adequate precautions are taken to ensure its stability.

5.6.17 No fixed crane shall be used unless it is securely anchored or adequately weighted as to secure stability.

5.6.18 Every travelling jib crane on rails shall be provided with guards to remove any loose material from the track, which shall be provided with effective stops at the end.

5.6.19 When the stability of the crane is secured by means of removable weights a diagram or notice indicating the position and amount of such weights shall be fixed on the crane where it can readily be seen.

COMPETENT PERSONS FOR OPERATION:

5.6.20 Lifting appliance shall not be operated except by a person trained and competent to operate that appliance except that for the purpose of training it shall be permissible for any person to operate the appliance provided such a person is under the direct supervision of a competent person. Operators shall have the following additional qualifications:

i) Be able to read and understand the signs, notices, operating instructions and signal code used.

ii) Be not less than 21 years of age.

iii) Must have had a physical examination within one year to determine that they have no deficiencies of eyesight or hearing or they are not subject to epilepsy, heart failure, or similar ailments that would be detrimental to safe operation of equipment.

5.6.21 If the person operating a lifting appliance has no clear view of the load, there shall be appointed signallers to give signals to the operator.

5.6.22 The crane operator should recognise signals from only one person designated as signalman.

5.6.23 Every crane operator and rigger should be made familiar with the rules and regulations for crane operators and standard crane signals for the safe operation of the crane.

TESTING AND EXAMINATION:

5.6.24 All lifting appliance shall be tested and thoroughly examined one in every period of four years and thoroughly examined once every year by a competent person.

5.6.25 Any lifting appliance, to which any substantial alteration has been carried out, shall not be taken into use unless it is tested and thoroughly examined by a competent person.

5.6.26 Results of all tests and thorough examinations shall be entered in a register to be maintained by the occupier.

MARKING OF SAFE WORKING LOADS:

5.6.27 The safe working load or safe working loads and a means of identification shall be plainly marked:

i) upon every crane, crab and which, and;

ii) upon every pulley block, gin wheel, shear legs or derrick pole or mast used in the raising or lowering of any load.

5.6.28 Every crane fitted with a derricking jib shall:

i) have plainly marked upon it the safe working loads at various radii of the jib and the maximum radius at which the jib may be worked; and

ii) be fitted with an accurate indicator, clearly visible to driver, showing the radius of the jib at any time and the safe working load corresponding to the radius.

5.6.29 No jib crane with fixed or derricking jib shall be used unless it is fitted with an automatic load indicator which gives an efficient sound signal when the load lifted is in excess of safe working load at that radius, provided that if the requirements of clauses 27 and 28 are compiled with, fitting of an automatic load indicator shall not be required.

5.6.30 The lifting appliance, shear legs or derrick pole or mast or any part thereof shall not be loaded beyond the safe working load except for the purpose of testing when it may be loaded to such amount as may be decided by a competent person for carrying out such tests.

SCOTCH GUY OR TOWER DERRICK CRANES:

5.6.31 No scotch derrick, guy derrick or tower derrick shall be used in any work unless:

a) It is of good construction, sound material, adequate strength and free from any defect that will endanger life of any worker.

b) All parts including anchorage have been thoroughly examined before erection and thoroughly examined and tested after erection by a competent person and results of such examination and test are entered in a register maintained for the purpose by the occupier; test load shall be 25 per cent above the maximum load to be lifted.

5.6.32 Maximum load to be lifted by the crane shall be marked on the crane in a position where it can readily be seen by the crane driver.

5.6.33 The jib of a scotch derrick crane shall be erected between the back stays of the crane.

5.6.34 No load which lies in the angle between the back stays of a scotch derrick crane shall be moved by the crane.

5.6.35 No crane shall be used for lifting a load, which is in excess of maximum load marked on the crane.

5.6.36 In Scotch and Tower Derrick cranes, appropriate measures shall be taken to prevent foot of king post being lifted out of the socket while it is in use, and in Guy Derrick crane, guys shall be suitably spaced to ensure stability of the crane.

5.6.37 The crane operators should test the brake for full load capacity, at least one a week while the crane is in use. Such testing every day, before the work is started, is recommended.

5.7 RAIL TRACKS, LOCOMOTIVES AND HAULAGE TRUCKS:

RAIL TRACKS AND LOCOMOTIVES:

5.7.1 Every rail track shall rest on a firm and even foundation and at each end it shall be provided with adequate stop blocks or buffers.

5.7.2 In any line of rails on which locomotive truck or wagon moves, there shall be adequate clearance so that persons are not liable to be crushed or trapped between walls, fixed structures, fencing or stack of materials, and a passing locomotive truck or wagon or any part of load thereon and where such clearance is not reasonably practicable, suitable recesses at a distance of not less than 6 metres along the line shall be provided and effective arrangements for warning any person of the danger, of being liable to be crushed or trapped, shall be made.

5.7.3 Every locomotive truck or wagon shall be fitted with effective brakes and a sufficient number of suitable springs or scotches shall be provided for the use of persons employed on the movement of trucks or wagons which shall be in good conditions and used whenever necessary.

5.7.4 Where any person is likely to be endangered by the movement of locomotive truck or wagon:

a) The locomotive shall be fitted an effective warning device;
b) The person in charge of movement of locomotive truck or wagon shall see that adequate warning is given before the locomotive truck or wagon is moved; and
c) When the locomotive truck or wagon is approaching any crossing, blind spot or any place where the driver of the locomotive is unable to see clearly a sufficient length of the track, the driver shall give adequate warning by means of a suitable sound signal.

5.7.5 Except where adequate handholds and footholds are provided, no person shall be required or permitted to ride on a buffer or on a running board or in any locomotive truck or wagon.

5.7.6 No person shall be required or permitted to remain on any vehicle or on any truck or wagon during the loading of loose material by means of grab, excavator or similar appliance if he is endangered by so remaining.

5.7.7 Where hauling locos have to work to dangerous limits, the travel of the loco beyond the safety limit should be arrested by stops of adequate height and strength.

HAULAGE TRUCKS:

5.7.8 Vehicles shall be maintained in good mechanical condition. Special attention should be given to brakes, horns, tyres, steering mechanism and signalling devices. Drivers of motors vehicles should be on the alert to observe defects and report them to take further appropriate action for their correction. Drivers shall operate vehicles with regard to proper protection of the mechanism hereof.

5.7.9 Constant attention, concentration and alertness shall be exercised by the driver while operating a motor vehicle. Driving will not be undertaken under fatigue, or drowsiness and drunkenness as they impair driving ability to a high degree until the condition causing the impairment has been relieved.

5.7.10 Every vehicle should carry notices of warning pasted in at a conspicuous place, containing the following instructions:

a) Persons travelling the vehicles, on duty, should sit at a safe place in it.
(b) They should not stand in the vehicle or sit on the top of side planks of the body.
(c) No person should get down from or get into the vehicle when it is in motion.

5.7.11 The log book of every vehicle should have a fly leaf containing the following instructions to the driver and the crew:

i) No person should be allowed to enter in the vehicle or travel in it except under written orders of the concerned Executive Engineer or any other officer in charge or his subordinate duly authorised in this behalf. Any infringement of this rule shall render the driver and the cleaner liable for punishment.
ii) They should be prohibited from standing in the vehicle or sitting on the top of the side planks of the body.
iii) No person should be allowed to get down from or get into the vehicle while it is in motion.
iv) The cleaner should act as the conductor of a transport bus and should look after the safety of the crew and others travelling in it.

5.7.12 No driver of a truck shall back up a truck unless assisted by a signal man who shall have a clear view of the driver and the area behind the truck during each backing up operation.

5.7.13 As far as possible, loaded trucks should not be backed on gradients. Stumbling blocks must always be put in place to prevent the truck from moving down a gradient.

5.7.14 In slopes if should be ensured that every heavily loaded trailers are not used behind light hauling units.

5.7.15 The driver should not drive too fast, should avoid distractions and drive defensively. The driver should not attempt to overtake another vehicle unless he can plainly see far enough ahead to be sure he can pass safely; proper horn signal should be given before passing.

5.7.16 Before crossing rail-road track, the driver should reduce speed, look in both directions along track and proceed across track only if it is safe to do so.

5.7.17 Material shall not be loaded in a truck so as to protect horizontally beyond the sides of the body and any material projecting beyond the front or rear shall be indicated by a red flag during the day and a red light during the night.

5.7.18 Workmen shall not be transported standing in the truck with their heads above the cab where they are liable to be injured by low hanging wires, tree branches etc.

5.7.19 Loaded haulage trucks shall not be allowed to carry labourers on the top of their load.

5.7.20 Where any vehicle is used for tipping material into any excavation or pit or over the edge of any embankment or earthwork, adequate measures, such as the provision of suitable blocks, shall be taken where necessary so as to prevent such vehicle from overrunning the edge of such excavation, pit, embankment or earthwork.

5.8 BOILERS AND COMPRESSORS:

BOILERS:

5.8.1 All steam boilers shall comply with provision of Boiler Regulations.

UNFIRED PRESSURE VESSELS:

5.8.2 Other pressure vessels shall comply with the provisions of rules framed under section 31 of Factories Act, 1948.

AIR COMPRESSORS:

5.8.3 Air Compressors should not be operated at speeds greater than those listed by the manufacturer, as explosions of compressors are sometimes due to excessive speeds.

5.8.4 Compressors should be securely anchored to firm foundation as the sudden and frequent variations in load cause considerable vibration and impose severe shocks upon the equipment.

5.8.5 At a pressure of 8 kgs per square cms as the temperature in an air cylinder may reach 200 degrees C., which is sufficient to volatilise. The lubricating oil shall, therefore, have high flash points.

5.8.6 Every air compressor shall be equipped with an automatic mechanism so arranged that the compressor will automatically stop its air compressing operation before the discharge pressure exceeds the maximum safe working pressure allowable on the weakest portion of the system to which the compressor is attached.

AIR RECEIVERS:

5.8.7 Under no circumstances should a receiver be installed without a pressure guage, and a relief or safety valve so proportioned and adjusted that the pressure will never exceed the maximum allowable working pressure of the tank by more than six percent.

5.8.8 A drain pipe should be installed at the lowest point of every compressed air tank or receiver.

5.8.9 No stop valve should be placed in the air line between the compressor and the air receiver unless spring loaded safety valves are installed between the compressor and the stop valve.

5.8.10 Gauge and valves shall be regularly inspected.

5.8.11 Air receiver shall be drained and cleaned of oil and water every six months or more often if so specified by State laws.

5.8.12 The manhole or hand hole shall be opened every six months and the inside of the receiver checked.

5.8.13 When operating under dusty conditions, the relief valve shall be checked at least every month.

5.9 HEAVY MACHINERY:

INSPECTION:

5.9.1 Before any machinery or mechanised equipment is put into use on the job, it shall be inspected by a competent person and determined to be in safe operating condition. Continued periodic inspection shall be made at such intervals as necessary to ensure its safe operating condition and proper maintenance.

5.9.2 Any machinery or equipment found to be in an unsafe operating condition shall be tagged at the operator's position, labelled "Out of order"' "Do not Use", and its use prohibited until unsafe conditions have been rectified.

5.9.3 Inspections or determinations shall be made to ensure that clearance and load capacities are safe for the passage or placing of any machinery or equipment, before permitting passage or placement.

OPERATIONS:

5.9.4 Machinery and mechanised equipment shall be operated only by qualified and authorised personnel.

5.9.5 Riding on equipment by unauthorised personnel is prohibited.

5.9.6 Getting off or on any equipment while it is in motion is prohibited.

5.9.7 Machinery or equipment requiring an operator shall not be permitted to run unattended. Where practicable, equipment left unattended shall be locked to prevent starting by unauthorised persons.

5.9.8 Machinery and equipment shall not be operated in a position where any part of the machine, suspended loads or lines can be brought closer than 3 metres from exposed high voltage lines unless the current has been shut off and positive means taken to prevent the lines from being energized. A notice of this requirement shall be posted at operator's position.

5.9.9 When rubber-tyred vehicles equipped with boom or ginpoles are being operated in the vicinity of power lines, a chain shall be attached to the metal frame with the loose and dragging on the ground.

5.9.10 Machinery or equipment shall not be operated in a manner that will endanger person or property nor shall the safe operating speeds or loads be exceeded.

5.9.11 An operator shall not be permitted to operate any machinery or equipment for more than 8 hours in any one day without a consecutive 8 hours interval of rest.

5.9.12 Operators and all workmen in the immediate vicinity shall avoid use of loose clothing, large open sleeves, bulky trousers etc.

5.9.13 No person shall take rest or sleep near a parked machine.

5.9.14 While going from one place to another, it shall be ensured that the culverts, etc. to be crossed are strong enough to take the heavy load passing over.

GUARDING, SAFETY DEVICES:

5.9.15 (i) Every moving part of prime mover, headrace and tailrace of every water wheel and water turbine and stockbar which projects beyond the head stock of a lathe shall be securely fenced.

(ii) Unless they are in such position of such construction as to be safe to every person as they would be if they were securely fenced, every part of an electric generator, a motor or rotary converter; and every part of transmission machinery and every dangerous part of any other machinery shall be securely fenced.

(iii) The fencing to be provided in (i) & (ii) shall be of substantial construction regardless of whether the machinery they are guarding are in use or not.

5.9.16 All hot surfaces of equipment, including exhaust pipes, or other lines which may be subject to high temperatures, exposed to contact by persons or which create a fire hazard, shall be suitably guarded or insulated.

5.9.17 Fuel tanks shall be located in a manner which will not allow spills or overflows to run into engine, exhaust or electrical equipments.

5.9.18 No guard, safety appliance, or device shall be removed from machinery or equipment, or made ineffective except for the purpose of making immediate repairs, lubrication or adjustments and only after the power has been shut off. All guards and devices shall be replaced immediately after completion or repairs and adjustments.

5.9.19 Suitable protection against the elements, falling or flying objects, swinging loads, and similar hazards shall be provided where appropriate for operation of all machinery or equipment. All glass used shall be "Safety Glass".

5.9.20 A warning device or services of a signalman shall be provided where there is danger to persons from moving equipment, swinging loads, buckets boom etc.

5.9.21 All machinery or equipment not equipped to prevent over-loading or excessive speed shall have safe load capacities and/or operating speed pasted at the operators position.

5.9.22 Stationary machinery and equipment shall be placed on a firm foundation and properly secured in place before being operated.

REPAIRS AND MAINTENANCE:

5.9.23 Except for testing, trial or adjustment which must necessarily be done while the machinery is in motion, all machinery and equipment shall be shut down and positive means taken to prevent its operation while repairs or manual lubrications are being made.

5.9.24 Any guard or safety device removed or ineffective shall be replaced or resorted to safe operating condition immediately after completion of work, which required its removal.

5.9.25 All repairs on machinery, equipment, or parts thereof which are suspended or held apart by use of slings, hoists, or jacks, shall also be substantially blocked or cribbed before men are permitted to work underneath or between them.

5.9.26 Heavy machinery, equipment, or parts thereof which are suspended or held apart by use of slings, hoists or jacks, shall also be substantially blocked or cribbed before

men are permitted to work underneath or between them.

EXCAVATORS-SHOVELS, DRAGLINES ETC:

5.9.27 Before starting the machine, a thorough visual inspection shall be made. All cable clamps, etc. shall be checked for excessive wear. The oiler should be off the rig before starting the engine. An operator should know where his oiler is at all times.

5.9.28 All persons must be kept beyond the range of cap swing. No one except operating personnel shall be permitted on the equipment while it is operating.

5.9.29 Operators and helpers should not indulge in unnecessary conversation while the equipment is in operation.

5.9.30 Walkways in or about the cab of any dragline or shovel shall be kept free of loose tools, grease containers, or other materials that might fall and present a tripping or failing hazard.

5.9.31 Operator, when loading materials into trucks, shall exercise such precautions as necessary to prevent injury to the truck driver or damage to the truck. If the truck is not provided with a substantial cab or shield, the driver should leave his seat while the truck is being loaded. Preferably the truck shall be loaded over the sides or rear and not over the truck cab.

5.9.32 Shovel dippers and dragline buckets should be lowered to the ground when the operator leaves the machine or during greasing operations.

5.9.33 Power shall be disconnected when repairs are made to electric shovels, draglines etc. Trailing cables must be kept off the ground, and should be handled only with insulated hooks. The framework of a shovel shall be grounded.

5.9.34 When being operated in soft or unstable ground, draglines and power shovels shall be supported by mats, heavy planks, or poles so as to distribute the load and prevent any danger of overturning.

5.9.35 No smoking shall be allowed during refuelling and engines must not be running while being refuelled. Open lights, flames, or sparks must be eliminated. Lights on the equipment shall be of an approved vapour proof type. Fuel which is carried to the machine by hand must be transported in an approved type of safety can. The type of safety can to be used, should be approved by the General Manager-in-Charge of the Project.

DUMPERS:

5.9.36 Dump trucks shall be maintained in first class working condition and regularly checked and inspected. Brakes shall be kept in efficient working condition. Trip and winding mechanism shall be daily examined and adjusted.

5.9.37 Dump truck used for hauling rock or overburden, which is loaded by shovels etc. should be equipped with safe overhead protection for the cab. Dump trucks shall not be moved backwards unless the driver has a clear view of the area behind the truck or has the assistance of a "spotter" or "pitman."

5.9.38 No person shall be allowed to work on a truck with the body in a raised position until after the truck body has been securely blocked in position.

5.9.39 While dumping by rear or side dumpers the workers shall stand clear of the vehicle and if sticky or heavy material is being dumped, dump hooks shall be used or the car clamped so that it cannot overturn.

TRACTORS AND BULLDOZERS:

5.9.40 Before starting the machine, a thorough visual inspection shall be made in order to minimise accidents. Check cables and cable clamps etc. for excessive wear. Check the position of other workmen before starting the machine. Use extreme caution when coupling to draw bar.

5.9.41 Only one person, the operator, should ride on a tractor the only exception being when the operator is teaching a student to drive and this should be done on a relatively smooth ground.

5.9.42 Tractors should never be left unattended with the engine running and brakes not set. When it is necessary to park tractors on slopping ground, they shall be securely blocked and the brakes set.

5.9.43 Operators of bulldozers should not drive with the blade raised so high that vision ahead is obscured and when the operator leaves the machine, the blade shall be lowered to the round.

MOTOR GRADER:

5.9.44 The prestarting inspection should be performed by checking foot and hand brakes.

5.9.45 When operating near obstructions, use low gear. The speed when travelling to or from the job site should not be excessive. When operating on a public highway, the blade tips should be flagged. Keep a sharp lookout at all times for other vehicles, cattle and pedestrians.

5.9.46 When Parking the machine, the blade should be turned inside the frame and lowered to the ground, set the hand-brake, and block the wheels if on an incline. The transmission may be left in low gear after the engine has been shut off, if additional braking force is needed.

PILE DRIVERS:

5.9.47 All plant, equipment and devices used in connection with pile driving work shall be constructed, installed, inspected, maintained and operated so as to prevent danger.

5.9.48 Every pile driver shall be firmly supported on heavy wood sills or substantial cribbing and shall be securely and safety guyed at all times and when steam or air hammers used, the hose shall be securely lashed to the hammer to prevent if from shipping, should a connection break.

5.9.49 While inserting the piles, the hammer shall be blocked in the leads and when a pile driver is not in use, the hammer shall be scotched at the bottom of the leads by means of a scotch.

5.9.50 Only pile driving crew members and authorised person shall be permitted in the actual work areas during driving operation.

5.9.51 Dogs on pile driver hoist drums, the automatically disengage either by relieving the load or rotating the drum shall be prohibited.

5.9.52 A safety lashing shall be provided for all hose connections to pile driver hammers, pile ejectors, or jet pipes.

5.9.53 Hanging or swinging leads of pile drivers shall have fixed ladders. Employees shall be prohibited from remaining on leads or ladders while pile is being driven.

5.9.54 Fixed pile driver leads shall be provided with decked landings having guard rails and toe boards. Fixed leaders or stairs shall be provided for access to landings and headblocks.

5.9.55 Landing or leads shall not be used for storage of any kind.

5.9.56 Pile driver leads shall be provided with stop blocks to prevent the hammer from being raised against headblock.

5.9.57 Pile hammers shall be lowered to bottom of leads while pile driver is being moved.

5.9.58 Suitable guys, outriggers, thrustouts, counter-balances or rail clamps, shall be provided as necessary to maintain stability of pile driver rigs.

5.9.59 Taglines shall be used for controlling 'unguided piles' and 'flying hammer.'

5.9.60 Hoisting of steel piling shall be done by use of a closed shackle or other positive mean of attachment that will prevent accidental disengagement.

5.9.61 When steam driven hammers are used, the boiler shall comply with all requirements of boiler code. The steam hose and connection shall be inspected frequently and the hose shall be lashed in place, so far as practicable, to minimise the danger of men being scalded in case of a broken connection. All steam lines shall be controlled by shut off valves located within easy reach of the operators.

CHAPTER 6
MISCELLANEOUS

6.1 STORAGE OF MATERIALS:

6.1.1 All materials in bags, containers or bundles stored in tiers shall be stacked, blocked, interlocked, and limited in height so that it is stable and otherwise secured against sliding or collapse.

6.1.2 Inflammable liquids and grease shall be stored in a 'NO SMOKING' area and properly separated from other stored materials.

6.1.3 Used lumber shall have all nails withdrawn before it is stacked for storage.

6.1.4 In withdrawing sand, gravel, and crushed stone from frozen stockpiles, no overhanging shall exist at any time.

6.1.5 Materials dumped against walls or partitions shall not be stored to a height that will endanger the stability or exceed the resting strength of such walls and partitions.

6.1.6 Persons working in hoppers or on high piles of loose material shall be equipped with life lines and safety belts.

6.2 ATMOSPHERE IN CONFINED PLACES:

6.2.1 In every working place where persons are required to work in a confined place, adequate ventilation by the circulation of fresh air shall be provided an no person shall be allowed to enter any place where there is reason to apprehend that the atmosphere is poisonous or asphyxiating unless the person wears a suitable breathing apparatus and is equipped with life line held by a person stationed for the purpose in safe place.

6.2.2 When workers are employed in sewers and manholes which are in use, it shall be ensured that the manhole covers are opened and ventilated at least for an hour before the workers are allowed to get into the manholes and the manholes so opened shall be cordoned off with suitable railing and provided with warning signals or boards to prevent accidents to the public.

6.2.3 There shall also be provided in a suitable position and readily available sufficient and appropriate rescue apparatus including:

i) Suitable breathing apparatus;
ii) Suitable reviving apparatus; and
iii) Suitable safety belts of sound material with ropes of adequate length and strength.

All such equipment and apparatus shall be in charge of a competent person conversant with their use and he shall be available at all time while any person is working in the confined place. All such equipment shall be properly maintained, tested and examined at intervals of not more than one month.

6.3 PREVENTION FROM DROWNING:

6.3.1 Where adjacent to the site of any operation there is water, into which a person employed, in the course of his employment, is liable to fall with risk of drowning, suitable rescue equipment shall be provided and maintained in an efficient state and steps shall be taken for the prompt rescue of any such person in danger of drowning.

6.3.2 The rescue equipment shall include life saving skiffs properly maintained with life vests and life buoys of approved type with 16 metres of 10mm rope attached.

6.3.3 Life preservers, vests or belts shall be worn by all persons while working:

(a) On floating pipeline, pontoons, rafts, float stages etc;
(b) On open deck-floating plant not equipped with bulwarks, guardrails or other life lines;
(c) On structures extending over or adjacent to water except where proper guardrail or safety belts and life lines are provided;
(d) Working alone at night where there are potential drowning hazards regardless of other safeguards provided and;
(e) In skiffs, small boats or launches except when inside of enclosed cabin or cockpit.

6.3.4 Life preservers or working vests shall have a buoyancy of at least 7.5 kgs. When new and shall be removed from service when buoyancy decreases below 5.75 kgs.

6.3.5 Walkways and structures extending over or immediately adjacent to water shall be provided with ring buoys of 7.5 kgs buoyancy at intervals of not more than 90metres.

6.4 FIRE PREVENTION AND PROTECTION:

FIRE PREVENTION:

6.4.1 All construction areas and storage yards should be kept clean and well arranged.

6.4.2 A clear space of 15 metres around the outer boundary of sawmill and lumber storage area may be provided. All lumber should be stored in sections with firebreaks with a distance of 15 metres between consecutive sections.

6.4.3 All combustible waste material, wood scalings, soiled rags etc. shall be removed daily and burden in suitable burning areas. The saw mill and lumber yard shall be kept free from accumulation of combustible debris.

6.4.4 Fires, welding, flame cutting shall in general not permitted in combustible areas. Fires and open flame devices shall not be left unattended.

6.4.5 Smoking shall be prohibited in all flammable material storages viz. carpentry, pain shops garages, services stations etc. "No smoking" signs should be posted on all such areas.

6.4.6 Accumulations of flammable liquids on floors, walks etc. should be prohibited. All spills of flammable liquids shall be cleaned up immediately.

6.4.7 Smoke pipes from Diesel Engines passing through roof of combustible material e.g. in compressor stations at dam site and quarry shall be insulated by asbestos. All joints of smoke pipe should be riveted, welded or otherwise securely fastened together and supported to prevent accidental displacement or separation. The joints should not be leaky.

6.4.8 Flammable liquids, lubricants etc. should be handled and transported in safety containers and drums which can be kept tightly capped.

6.4.9 Petrol or other flammable liquids with a flash point below 100^0F shall not be used for cleaning purposes.

6.4.10 Oxygen cylinders shall not be stored with combustible materials.

6.4.11 All electric installations should be properly earthed. Repairs should not be made on electrical circuits until the circuit has de-energized.

FIRE FIGHTING ARRANGEMENTS;

6.4.12 Fire extinguishers and fire buckets, painted red, shall be provided at all fire hazardous locations viz. Batching and Mixing Plant, which Houses, Workshops. Store yards, Saw-Mill, Switch Gear Room, Compressor Stations, Office establishments etc. The extinguishers shall be inspected serviced and maintained in accordance with manufacturer's instructions. The inspections shall be evidenced by notations on tag attached to the extinguisher.

6.4.13 Where building and establishments are located in or near cities or towns, definite arrangements shall be made to ensure protection by the established municipal fire department In more isolated locations, it will be necessary to provide for and install complete fire fighting facilities including provision for fire tenders commensurate with the number, size and importance of buildings, equipments, or supplies to be protected.

6.4.14 Full reliance should never be placed on portable hand extinguishers as all of these have a very limited capacity. Water, in ample amounts and under adequate pressure, should always be available for fire fighting.

6.4.15 Where a group of buildings are located beyond the range of protection from a public water supply, the installation of water system for private fire protection may be warranted. The following design factors should be considered in the planning of a private water supply. The standard fire stream is recognised as 1155 litres per minute. Multiple streams of 1155 litres must be provided for protection of important groups of buildings. While the daily domestic consumption is basis used in the design of a domestic type of water system, additional capacities should be provided for use during fire emergencies. For example, two standard fire streams (2310 litres per minute) discharged for 1/2 hour amount to 69,300 litres of water. Therefore, additional water storage for fire use must be provided. A loop system of hydrants from two directions with a reduction of friction losses and a resultant higher water pressure for fire-fighting purposes. No underground pipes that are a part of the system should be smaller than 15 cms in diameter and valves should be provided for shutting of the domestic connection outside of all building served. Hydrants should not be over 120m apart and so located that not less than two hose streams concentrate on any building. Hydrants in cold climate should be designed and installed to prevent freezing. Two 90mm outlets with standard 5 hose thread should be used for all private hydrants. It is good practice to provide hose houses at hydrants in a private water supply system. The houses should be equipped with a minimum of 90metres of 90mm hose and accessories, including axes, spanner, wrench and other tools.

6.4.16 Excavation facilities and fire exit may be provided at all locations featuring the hazards.

6.4.17 Siren or other suitable fire alarm arrangement shall be made on all projects. Warning signs may be posted at all locations featuring fire hazards.

6.4.18 All staff shall be conversant with the use of all types of fire extinguishing apparatuses.

6.4.19 Demonstrations and training in fire fighting shall be conducted at sufficient intervals to ensure that sufficient personnel are familiar with and are cable of operating fire fighting equipment.

6.5 FIRST AID AND MEDICAL CARE:

6.5.1 At every work site suitable arrangement for rendering prompt and efficient first aid to injured persons shall be maintained under the guidance of the Medical Officer in charge of the project.

6.5.2 First aid appliances including an adequate supply of sterilised dressings and sterilised cotton wool shall be maintained in a readily accessible place. The appliances shall be kept in good order and they shall be placed under the charge of a responsible person who shall be readily available during working hours. The minimum requirements of the first aid kit shall be as under:

10 cms compressed bandage - 12 Nos.

5 cms compressed bandage - 12 nos.

2.5 cms adhesive plaster - 1 reel

1 metre triangular bandage - 3 Nos.

Spirit Ammonia Aromatic - 1 bottle

(4 ounces)

Tannic acid jelly - 1 tube

Tineture iodine - 1 bottle

(2 ounces)

Tourniquet - 1 No.

Foreceps - 1 No.

When purchasing first aid kits, dust proof containers should be specified.

6.5.3 Where work sites are remote from regular hospitals an indoor ward in charge of a Medical Officer with such nursing staff as may be necessary shall be provided with one bed for every 250 workers.

6.5.4 Adequate identification and directional markers shall be provided to readily denote location of all first aid stations and hospitals.

6.5.5 An ambulance shall be provided to transport seriously injured persons to the hospital.

6.5.6 Small crews working at a distance from the project headquarters or from the main body of workmen shall be equipped with standard first-aid kits and at least one man in each crew shall have had first aid training.

6.5.7 Adequate lighting, heat, water and ventilation shall be provided in the first aid station and/or hospital.

6.5.8 The Medical Officer in charge of the project should be responsible for issuing special instruction indicating certain 'do's and 'don'ts' on subjects like sunstroke, heat exhaustion, sanitation, out-break of epidemics etc.

6.6 PERSONAL PROTECTIVE EQUIPMENT:

6.6.1 The following safety equipment shall be provided to workers as required and their use enforced:

Rubber boots; hard toe safety boots; hard hats; safety belts; goggles for stone or metal grinders, stone chippers, gas welding aprons; respirator shields; manila ropes and slings for

life lines; gloves; flashlights; battery lamps, magazine shoes; safety nets; boatswains chairs; helmets, life and ring buoys.

6.6.2 Items of personal wear shall be maintained in serviceable condition and shall, before being reissued to other employees or returned to stores be cleaned, sterilised, inspected and repaired, if necessary.

6.6.3 Loose and frayed clothing, hand rings loose watch chains etc. shall not be worn around moving machinery or other sources of entanglement.

6.6.4 The use of personal safety equipment as occasioned by the type of work being performed has been indicated in relevant places of this Manual.

6.7 MISCELLANEOUS

SECURITY OF LOADS

6.7.1 Every receptacle used for raising or lowering stone, bricks, tiles, slates, or other objects shall be so enclosed, constructed or designed as to prevent the accidental fall of such objects.

6.7.2 All gears, tools, goods or loose material shall be properly loaded into the bucket or receptacle in which they are being raised or lowered and if necessary, properly secured or effective precautions shall be taken by enclosure or otherwise to prevent their fall.

PROJECTING NAILS:

6.7.3 No timber or material with projecting nails shall be used in any work in which they are a source of danger to such persons.

DANGER FROM COLLAPSE OF STRUCTURE:

6.7.4 When any work is carried on which is likely to affect the security or stability of a building or structure or any part thereof and endanger any persons employed, all practicable precautions shall be taken by shoring or otherwise to prevent collapse of the building of structure or fall of any part thereof and thus remove the cause of danger to such structures and the persons employed.

HANDLING OF CORROSIVE MATERIALS:

6.7.5 For persons engaged in handling of corrosive materials adequate equipment shall be provided.

6.7.6 Where in connection with any grinding, cleaning, spraying or manipulation of any material there is given off any dust or fume of such character and to such extent as is likely to be injurious to the health of persons employed, all practical measures shall be taken by securing adequate ventilation or by the provisions and use of suitable respirators or otherwise to prevent inhalation of such dust and fume.

LEAD COMPOUNDS AND OTHER POISONOUS SUBSTANCES;

6.7.7 Men below the age of 18 years and women shall not be employed on the work of painting with products containing lead in any form. Wherever men above age of eighteen years reemployed on the work of lead painting, the following precautions shall be taken:

(a) No paint containing lead or lead products shall be used except in the form of paste or readymade paint.
(b) Suitable face masks should be supplied for use by the workers when paint is applied in the form of spray or a surface having lead paint dry rubbed and scrapped.
(c) Overalls shall be supplied to the workmen and adequate facilities shall be provided to enable the working painters to wash during the cessation of work.
(d) While lead, sulphate of lead, or product containing these pigments shall not in painting operation, except in the form of pastes or paints ready for use.
(e) Cases of lead poisoning, and suspected lead poisoning shall be immediately notified, and shall be subsequently verified by a member appointed by the competent authority of project.
(f) Instructions with regard to special hygienic precautions to be taken in the painting trade shall be distributed to working painters.

6.7.8 Lead compounds shall not be used in the form of a spray in the interior painting of the structures.

6.7.9 Road work:

Workers employed on mixing asphalt materials shall be provided with protective footwear and protective goggles.

Stonebreakers shall be provided with protective goggles and protective clothing and seated at sufficient safe distance from each other.

UNDERTAKING

I/We hereby undertake that I/we have read the complete safety manual which is placed in the tender document and accept all Terms & Conditions of Safety Manual of NHPC Limited un-conditionally.

(Signature & Stamp of Contractor)

(-SD/-)

DGM(IT)-P&C

P&C Division, CPS-I

Check list/Documents to be submitted with signed and stamped:

Sl. No.	Particulars	Remarks
01.	EMD of**₹83,000/- (** 2% Rounding**)** or Self certified Copy of valid Certificate towards exemption of EMD	EMD to be deposited through Demand Draft in favour of "NHPC Limited" payable at Chamera-I Power Station, Khairi, Chamba or RTGS/NEFT in NHPC bank account mentioned in Bid. In case of exemption, a copy of valid Certificate towards exemption of EMD is required to be submitted with bid.
02.	Un-priced schedule of Quantity (Section-II)	To be uploaded with bid documents **without filling prices** duly signed and stamped as acceptance.
03.	Scope of Work &v Technical Specifications, GTP, Drawings etc (Section -IV)	To be uploaded with signed and stamped as acceptance.
04.	Acceptance of Additional Terms and Conditions	To be uploaded with signed and stamped as acceptance or attach deviations, if any.
05.	GST, PAN Card	To be uploaded with signed and stamped
06.	ISO 9001 certificate	To be uploaded confirming as per qualification criteria attached.
07.	Bid Performa (Annexure-I)	To be uploaded with filled-signed and stamped
08.	ECS-Form(Annexure-II)/Cancelled cheque/EFT Mandate	To be uploaded with filled-signed and stamped
09.	Declaration/Undertaking under MSMED Act, 2006 (Annexure-III)	To be uploaded with filled-signed and stamped
10.	Declaration Regarding Applicability of Start-Ups under Start-Up India Initiative (Annexure-IV)	To be uploaded with filled-signed and stamped
11.	No Deviation Declaration (Annexure-V)	To be uploaded with filled-signed and stamped
12.	Insolvency and Bankruptcy Code 2016 (ANNEXURE-VI)	Undertaking regarding proceedings for Insolvency under Insolvency and Bankruptcy Code 2016 act to be uploaded
13.	Declaration Regarding Make in India (Annexure-VII)	To be uploaded with filled-signed and stamped
14.	Undertaking by Bidder towards Anti-Profiteering Clause of GST Act/Rules (Annexure-VIII)	To be uploaded with filled-signed and stamped
15.	Declaration for Income Tax Return Filing Status (Annexure-IX)	To be uploaded with filled-signed and stamped along with copy of ITR Acknowledgment.
16.	Declaration regarding land border sharing (Annexure-X)	To be uploaded with filled-signed and stamped
17.	Declaration Regarding Banning of Business dealings (Annexure-XI)	To be uploaded with filled-signed and stamped
18.	Integrity Pact (Annexure-XII)	To be uploaded with filled-signed and stamped

19	Financial Information	Upload Turnover/Annual report/ Annual Financial statement containing Balance sheet oflast 3 years.
20	Special Condition of Contract (Section–V)	To be uploaded with signed and stamped
21	QAP & Safety Manual (Section–VI)	To be uploaded undertaking for having read the Safety manual with signed and stamped on letterhead.
22	Others	Any other information if bidder wanted to submit