

TENDER DOCUMENT

FOR

Planning, Design, Engineering, Construction, Fabrication, Supply, Erection, Trial-run, Commissioning and Testing of Rapid Loading System on Existing Railway siding for 5.0Mtpa capacity Patherdih Washery & comprising of all Civil, Structural, Electrical and Mechanical Works and all other accessories and facilities as required to make it complete in all respects, on turnkey basis.

PART-I: TECHNO-COMMERCIAL



BHARAT COKING COAL LIMITED (A MINIRATNA COMPANY)

(A Subsidiary of Coal India Limited – A Maharatna Company)

REGD.OFF: KOYLA BHAWAN, KOYLA NAGAR

DHANBAD- 826005

CIN: U10101JH972GO1000918

CONTRACT MANAGEMENT CELL

Level - V, KOYLA BHAWAN, BCCL

PHONE NO.0326-2230206/FAX-0326-2230206

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BHARAT COKING COAL LIMITED

(A Mini Ratna Company)

CONTRACT MANAGEMENT CELL

Level – V KoylaBhawan, Koyla Nagar,
Dhanbad-826005

CIN: U10101JH1972GOI000918

Phone No.0326-2230206/Fax-0326-2230206,

Email ID: gcmcc.bcl@coalindia.in

NIT No.: BCCL/CMC/E-TENDER/RLS PATHERDIH /2020/ 250

Date: 28-07-2020

e- NOTICE INVITING TENDER

1. Digitally signed and encrypted E-Tenders are invited under Two Part system on-line on the e-tendering portal of CIL <https://coalindiatenders.nic.in> from the reputed and experienced contractors for the following work:

Description of work	Location	Estimated value	Earnest Money/ Bid Security	Period of Work
Planning, Design, Engineering, Construction, Fabrication, Supply, Erection, Trial-run, Commissioning and Testing of Rapid Loading System on Existing Railway siding for 5.0 Mtpa capacity Patherdih Washery & comprising of all Civil, Structural, Electrical and Mechanical Works and all other accessories and facilities as required to make it complete in all respects, on turnkey basis.	Patherdih 5.0 MTPA NLW Washery, BCCL, Dhanbad, Jharkhand	INR 24,40,73,000.00 (Rupees Twenty Four Crores Forty Lakh Seventy Three Thousand) only. (Inclusive of GST@ 18%)	INR 48,81,500.00 (Rupees Forty Eight Lakh Eighty One Thousand Five Hundred) only.	270 days

Note: The Bid document will be available on the following websites for downloading at free of cost.

1. <https://coalindiatenders.nic.in>
2. <http://www.bcclweb.in>
3. <http://eprocure.gov.in>

2. Time Schedule of E-Tender:

Sl. No.	Particulars	Date (DD/MM/YYYY)	Time (HH:MM)
1	Date of NIT	28.07.2020	--
2	Tender e-Publication date	29.07.2020	10:00
3	Document download start date	29.07.2020	10:00
4	Document download end date	15.08.2020	17:00
5	Bid Submission start date	30.07.2020	10:00
6	Bid submission end date	15.08.2020	17:00
7	Start date for seeking Clarification online	29.07.2020	10:00
8	Last date for seeking Clarification online	08.08.2020	17:00
9	End date of providing clarification by BCCL online	13.08.2020	17:00
10	Date of Opening of Tender [Part-I (Techno-Commercial bid)]	17.08.2020	11:00
11	Date of Opening of Tender [Part –II (price bid)]	17.09.2020	11:00

Note: If the numbers of bids received online is found to be less than Three (03) on end date of bid submission then the following critical dates of the tender will be automatically extended initially for a period of two days ending at 17:00 hrs and if the number of bids still remains less than three then for another five days ending at 17:00 hrs:

- Last date of submission of Bid
- Last date of submission of EMD
- Date of opening of Tender

If any of the above extended Dates falls on Holiday i.e. a non-working day as defined in the e-Procurement Portal then the same is to be rescheduled to the next working day.

This extension will be also applicable in case of receipt of zero bid.

In these extended period any new bidder can submit his/their tender online. However, the existing bidder(s) will be allowed to modify his/their submission as per provision of Clause 12 of NIT.

The validity period of tender should be decided based on the final end date of submission of bids.

The auto extension shall work on the basis of number of bids received only. (It may so happen that any of these bids may be eventually rejected during Tender Opening, Technical evaluation or further process of evaluation resulting the total number of valid bids becoming less than three.)

After two extensions, the tender shall be opened irrespective of available number of bids on the extended date of opening of tender.

3. Deposit of EMD:

The bidder will have to make the payment of EMD through ONLINE mode only. No Offline mode of Payment of EMD/Bid security shall be applicable and acceptable.

In online mode the bidder can make payment of EMD in the e procurement portal either through net-banking from designated Banks/s or through NEFT/RTGS from any scheduled Bank. In case of payment through net-banking the money will be transferred to BCCL's designated Account. In case of payment through NEFT/RTGS the bidder will have to make payment as per the Challan generated by system on e-Procurement portal and will have to upload the document regarding UTR number before submission of bid. Bidder will be allowed by the system to submit the bid only when the EMD is successfully received in BCCL's account and the information flows from Bank's Server to e-Procurement portal. No bid will be accepted unless accompanied by requisite EMD as stated above.

4. Seeking online Clarification by Bidder:

The bidder may seek clarification online within the specified period. The identity of the bidder will not be disclosed by the system. The department will clarify as far as possible only the relevant queries of bidders within specified period. The clarifications given by department will be visible to all the bidders intending to participate in that tender.

5. Eligible Bidders:

The invitation for bid is open to all bidders including an Individual, Proprietorship firm, Partnership firm, Company or a Joint Venture having eligibility to participate as per eligibility criteria stipulated in **clause No. 6** of NIT and having Digital Signature Certificate (DSC) of minimum class-II type (with signing & encryption certificate) issued from any agency authorized by Controller of Certifying Authority (CCA), Govt. of India and which can be traced up to the chain of trust to the Root Certificate of CCA.

The bidders must accept unconditionally the **User Portal Agreement** on-line in order to become an eligible bidder. The format of User Portal Agreement is enclosed at Annexure-L. This will be a part of agreement and No conditional tender bid shall be accepted.

Note: Joint Venture: Two or three companies/ contractors may participate in the tender as Joint Venture (Format of JOINT VENTURE Agreement is at Annexure – N). However, the Joint Venture has to enroll as a separate bidder in its own name & style in the e-tendering portal of CIL <https://coalindiatenders.nic.in>. Joint Ventures must comply with following requirements along with requirement as at point no **2.3 of ITB**:

5.1 The minimum qualification requirements for Joint Ventures: The qualifying criteria parameters e.g. experience, financial resources etc of the individual partners of the J.V.(Joint Venture) will be added together and the total criteria should not be less than as spelt out in qualification criteria.

5.2 The formation of Joint Venture or change in the Joint Venture character/partners after submission of

the bid and any change in the bidding regarding Joint Venture will not be permitted.

5.3 Joint Venture Agreement should legally bind all partners jointly and severally.

5.4. The pre-qualification of a Joint Venture does not necessarily pre-qualify any of its partners individually or as a partner in any other joint venture or association. In case of dissolution of a joint venture, each one of the constituent firms may pre-qualify if they meet all the pre-qualification requirements, subject to written approval of the employer.

5.5. The JOINT VENTURE Agreement must include the relationship between Joint Venture partners in the form of JOINT VENTURE Agreement to legally bind all partners jointly and severally for the proposed agreement which should set out the principles for the constitution, operation, responsibilities regarding work and financial arrangements, participation (percentage share in the total) and liabilities (joint and several) in respect of each and all of the firms in the Joint Venture.

Such JOINT VENTURE Agreement must evidence the commitment of the parties to bid for the facilities applied for (if pre-qualified) and to execute the contract for the facilities if their bid is successful.

5.6. One of the partners responsible for performing a key component of the contract shall be designated as Lead Partner. This authorization shall be evidenced by a Power of Attorney signed by legally authorized signatories of all the partners.

5.7. The Joint Venture Agreement must provide that the Lead Partner shall be authorized to incur liabilities and receive instructions for and on behalf of any and all partners of the Joint Venture and the entire execution of the contract shall be done with active participation of the Lead Partner.

5.8 The contract agreement should be signed jointly by each Joint Venture Partners. An entity can be a partner in only one Joint Venture. Bid submitted by any Joint Venture including the same entity as partner in the same tender will be rejected. Also, a partner/entity of a JOINT VENTURE cannot submit bid in the same tender independently. In such situation bids of the partner/entity and the Joint Venture both will be rejected.

5.8 The Joint Venture agreement may specify the share of each individual partner for the purpose of execution of this contract. This is required only for the sole purpose of apportioning the value of the contract to that extent to individual partner for subsequent submission in other bids if he intends to do so for the purpose of the qualification in that tender.

6. Eligibility Criteria:

A. Work Experience:

The intending tenderer must have in its name experience of having successfully completed similar works during **last 7 (Seven) years** ending last day of month previous to the one in which bid applications are invited i.e. e-publication date on procurement portal should be any of the following:

i) Three similar completed works each costing not less than the amount equal to 20% of the estimated cost put to tender.

Or

ii) Two similar completed works each costing not less than the amount equal to 25% of the estimated cost put to tender.

Or

iii) One similar completed work costing not less than the amount equal to 40% of the estimated cost put to tender.

The definition of similar work shall be “Planning, Design, Engineering, Fabrication, Supply, Construction, Erection, Commissioning, Trial-run and Testing of Rapid Loading System in Coal Handling / Material Handling Plant / System consists of a Hopper / Loading Hopper with Pre-weigh Rapid Loading System on Turnkey Basis”

The intending tenderer must submit documentary evidence in support of above in the form of

- (i) certified copy of work order,
- (ii) completion certificate indicating value and period of work, The TDS certificate be submitted during clarification, if any.

Note:

1). The experience towards overseas jobs, if submitted, should be vetted/endorsed by the relevant* embassy/high commission concerned, towards authenticity of document in English or translated in English language.

(*Relevant embassy/High Commission means the embassy/High Commission in India of the country where the bidder has executed the said work or country of origin of the bidder OR the Indian embassy in the country where bidder has executed the work or country of origin of the bidder.)

The above qualification criteria shall be fulfilled by JV in the following manner:

The qualifying criteria parameter e.g. experience of the individual partners of the J.V will be added together as deliberated hereinafter towards fulfillment of qualification criteria related to experience.

a) In case of completion of single work of similar nature costing, not less than the amount equal to 40% of the estimated cost put to tender:-

i) Any of the JV partner shall have the experience of having completed successfully a single work of similar nature equal to 40% of the estimated cost put to tender.

Or

b) In case of completion of two works of similar nature each costing not less than the amount equal to 25% of the estimated cost put to tender :-

i) Any one partner can match the above requirement.

Or

ii) At least two partners should each have completed at least one work of similar nature each costing not less than the amount equal to 25% of the estimated cost put to tender.

Or

c) In case of completion of three works of similar nature, each costing not less than the amount equal 20% of the estimated cost put to tender: -

i) Any one partner can match the above requirement.

Or

ii) Any two partners shall match the above requirement through completion of at least two work by one partner and one work by other partner of similar nature each costing not less than the amount equal 20% of the estimated cost put to tender: -

Or

iii) All the three partners shall match the above requirement through completion of at least one work of similar nature each costing not less than the amount equal 20% of the estimated cost put to tender.

However, during fulfillment of any of the above criteria one of the partner, who is the lead partner shall have:-

i) Maximum participating share in J.V. and

ii) Experience of having completed successfully a single work of similar nature equal to at least 20% of estimated cost put to tender.

Experience for those works only shall be considered for evaluation purposes, which match eligibility requirement stipulated above, on or before the last day of month previous to one in which tender has been invited (publication date of NIT). The experience of incomplete/ongoing works as on last date of eligibility period will not be considered for evaluation. If the referred work includes construction as well as maintenance after construction, the experience of such work may be considered as 'acceptable' if the construction part is completed as on the last date of 'eligibility period', even if maintenance work is ongoing, and the certificate issued clearly stipulates the same.

Completion of works means completion of works by undertaking entire responsibility from design, Supply, Installation, Construction and Commissioning.

In all the above cases, while considering the value of completed works, the full value of completed work be considered whether or not the date of commencement is within the said seven years period.

Cost of previous completed work(s) shall be given a simple weightage of 5% per year to bring them at current price level, while evaluating the qualification requirement of the bidder. Such weightage shall be considered after end date of completion. The year can be considered as suitable consecutive 365 days till the last day of month previous to one in which bid has been invited.

Updating will be considered for full or part of the year (total no. of days / 365) i.e. considering 365 days in a year, till the last day of month previous to one in which bid has been invited.

Data to be furnished by the Bidders:

- i. Start date & end date of each qualifying experience (similar nature)
- ii. Work order Number /Agreement Number of each experience
- iii. Name & address of Employer/Work Order Issuing authority of each experience.
- iv. Percentage (%) share of each experience (In case the experience has been earned by the bidder as a partner in a joint venture firm/partnership firm then the proportionate value of experience in proportion to actual share of bidder in that joint venture firm/ partnership firm will be considered against eligibility else it shall be taken as 100%).
- v. Executed Value of work against each experience.
- vi. In case the bidder is a Joint Venture, work experience as above may be furnished as the work experience of the bidder.

Scanned copy of documents to be uploaded by bidders (CONFIRMATORY DOCUMENT):

- a) Satisfactory Work Completion Certificate along with work order issued by the employer against the Experience of similar work containing all the information as sought on-line.
- b)BOQ and/ or TDS may be sought during clarification or along with deficient documents.

B. Financial Turnover

Average annual financial turnover during the last 3(three) years, ending 31st March of 2020 financial year should be at least 30% of the estimated cost put to tender.

The intending bidders must submit the Financial Turnover certificate (with UDIN No.) issued by a Practicing Chartered Accountant having a membership number with Institute of Chartered Accountants of India, containing the information as furnished by bidder online.

The foreign partner(s) should submit Financial Turnover certificate based on IFRS (International Financial Reporting Standards) accounting standard certified by a local practicing public accountant/audit firm duly vetted/endorsed by the relevant *Embassy/High Commission concerned, towards authenticity of document.

(*Relevant embassy/High Commission means the embassy/High Commission in India of the country where the bidder has obtained Turnover certificate or country of origin of the bidder OR the Indian embassy in the country where the bidder has obtained Turnover certificate or country of origin of the bidder.)

Note:

- i) Financial turnover shall be given a simple weightage of 5% per year to bring them at current price level, while evaluating the qualification requirement of the bidder. Such weightage shall be considered from the end date of financial year. Updating will be considered for full or part of the

year (total no. of days / 365) i.e. considering 365 days in a year, till the last day of month previous to one in which bid has been invited.

Joint Ventures shall meet the above eligibility requirement, in the following manner:

The qualifying criteria parameter e.g. financial resources of the individual partners of the J.V. will be added together, for the relevant financial year, and the total should not be less than as spelt out above. This is applicable for 6(C) also.

In respect of the above eligibility criteria the bidders are required to furnish the following information in (.xls format):

- i) Annual turnover of each of the last 3 years ending 31st March 2020 of the previous financial year.
- ii) Name of the Chartered Accountant issuing the Profit and Loss A/c or the Turnover Certificate.
- iii) Membership number of the Chartered Accountant.
- iv) Date of issue of Financial Turnover Certificate by Chartered Accountant.

Note:

- a) In case of Joint Venture, if financial turnover of all the partners is not submitted, the JV will not be disqualified and instead this shall consider assuming a value of zero for partner/ partners who has/have not submitted the financial turnover certificate.
- b) In case the bidder is a Joint Venture, the turnover of the individual partners of the joint venture will be added together for each financial year and each to be furnished as the turnover of the bidder for the particular financial year.

Scanned copy of documents to be uploaded by bidders (CONFIRMATORY DOCUMENT):

Turnover certificate certified by a practicing chartered accountant having a membership number with Institute of Chartered Accountant of India containing the information as furnished by bidder on-line.

C. Working Capital

The Bidder must submit the Certificate of possessing adequate Working Capital (at least 20% of the "Annualized value or Estimated value whichever is less" of this work) inclusive of access to lines of credit and availability of other financial resources to meet the requirement, issued by a Practicing Chartered Accountant having a Membership Number with Institute of Chartered Accountants of India. Such Certificate should contain the **Unique Document Identification Number (UDIN)**. The bidder should possess the Working Capital issued within three months prior to the date of opening of tender.

In case, access to lines of credit constitutes the availability of Working Capital, Banker's Certificate [Scheduled Commercial Bank] shall also be submitted regarding availability of access

to credit (issued within three months prior to the date of opening of tender) to meet the above eligibility criteria.

For foreign Partner(s), Banker's Certificate regarding availability of access to credit (issued within three months prior to the date of opening of tender) should be duly vetted/endorsed by the relevant Embassy/High Commission concerned, towards authenticity of document. Relevant Embassy/High Commission means the Embassy/High Commission in India of the Country where the bidder has obtained Banker's Certificate or Country of origin of the bidder).

Note: In case of tender of more than one-year contract period, the annualized value to be worked out as under :

Estimated cost of the work (including GST) put
Annualised Value = to tender. X 365 days

Period of construction of plant including trial run and
performance guarantee test in days.

Data to be furnished by Bidder in (.xls format):

- (i) Amount of available working capital inclusive of lines of credit and availability of other financial resources
- (ii) Date on which the bidder possesses the required working capital
- (iii) Name of the Chartered Accountant (CA)
- (iv) Membership Number of CA who certifies the bidder's working capital on a particular date.
- (v) Date of Issue of Certificate
- (vi) In case the bidder is a Joint Venture (JV), the above information in respect of each individual partner of Joint Venture may be furnished and the working capital of all partners will be added to calculate the Working Capital of the bidder.
- (vii) In case of Joint Venture, if working capital of all the partners is not submitted, the JV will not be disqualified and instead this shall consider assuming a value of zero for partner/ partners who has/have not submitted the working capital certificate.

Scanned copy of documents to be uploaded by bidders (CONFIRMATORY DOCUMENT):

Certificate of Working Capital issued by a Practicing Chartered Accountant having a membership number with Institute of Chartered Accountants of India containing the information as furnished by bidder online.

Note:-

Eligibility Criteria containing A. (Working Experience), B. (Financial Turnover)and C. (working Capital) will be in .xlsformat(Password Protected).This will be downloaded

by the bidder and requisite parameters in respect of the above shall be filled up on the excel file. Thereafter the bidder will upload the same excel file during bid submission in Cover-I.

D. Permanent Account Number (PAN):

The bidder should possess a Permanent Account Number (PAN) issued by Income tax Department.

In case of Joint Venture, all the partner should possess PAN.

In respect of the above eligibility criteria the bidders are required to furnish the following information online: -

Confirmation in the form of YES/NO regarding possessing PAN

Scanned copy of documents to be uploaded by bidders (CONFIRMATORY DOCUMENT):

- i. PAN card issued by Income Tax department, Govt. of India.
- ii. In case of JOINT VENTURE, PAN card for each Indian partner of Joint Venture and verifiable Tax Residency Certificate of respective country for each foreign partner or Joint Venture itself.

Note:

In case the work is awarded to a JOINT VENTURE participating in the tender they have to submit PAN on the name of the JOINT VENTURE after Award of Work at the time of execution of agreement/ before the payment of first running on account bill.

E. Certificate of registration with provident fund authorities:

The bidder should possess a certificate of registration issued by provident fund authorities. In case of JOINT VENTURE, all the partner should possess certificate of registration issued by provident fund authorities.

In respect of the above eligibility criteria the bidders are required to furnish the following information online: -

Confirmation in the form of YES/NO regarding possessing Certificate of registration with provident fund authorities.

Scanned copy of documents to be uploaded by bidders (CONFIRMATORY DOCUMENT):

- i. Certificate of registration with provident fund authorities in favour of bidder.
- ii. In case of JOINT VENTURE, Certificate of registration issued by provident fund authorities for each individual partner of JOINT VENTURE.

Note:

In case the work is awarded to a JOINT VENTURE participating in the tender they have to submit certificate of registration issued by provident fund authorities on the name of the

JOINT VENTURE after Award of Work at the time of execution of agreement/ before the payment of first running on account bill.

F. Deleted clause related with VAT.

G. Goods and Service Tax (Not Applicable for Exempted Services)

The bidder should be GST Registered Bidder (but not under composition scheme)

In respect of the above eligibility criteria the bidder is required to furnish the following information online:

Confirmation in the form of Yes/No regarding possessing of required document as enlisted in NIT with respect to GST status of the bidder.

Scanned copy of documents to be uploaded by bidders in support of information/ declaration furnished online by the bidder against Eligibility Criteria as Confirmatory Document

The following documents depending upon the status w.r.to GST as declared by Bidder in the BOQ sheet:

Status: GST registered Bidder (but not under composition scheme):

Document: GST Registration Certificate (i.e. GST identification Number) issued by appropriate authority of India

[In case of JV a Certificate from a practicing Chartered Accountant having membership number with Institute of Chartered Accountants of India confirming the status of JV w.r.to GST in compliance with relevant GST rules or GST Registration Certificate of JV]

Note:

In case the work/service is awarded to a Joint Venture participating in the tender they have to submit GST registration (as applicable in the tender and for the bidder status) etc. in the name of the Joint Venture after Award of Work/Service at the time of execution of agreement/ before the payment of first running on account bill.

H. General Essential Requirements:

In order to qualify in the tender, the bidders have to accept the following conditions:

- i. All the Terms and Condition of the NIT and Tender Document Unconditionally on line in the form of User Portal Agreement.
- ii. Expected values of each of the General Technical Evaluation (GTE) items.
- iii. To upload online the scanned copy of documents, as specified in the NIT for evaluation as per the clause 7 of the NIT

Data to be furnished by Bidder on-line:

- i. Confirmation in the form of **Agree/Disagree** for accepting user portal agreement
- ii. Confirmation in the form of **Yes/No** for each GTE item

Technical evaluation by the System:

System will capture data in the **Agree/Disagree OR YES/NO** format from the bidder and will decide the eligibility for (i) & (ii) above.

For (iii), the confirmatory documents will be downloaded and evaluated. The outcome is to be uploaded on line in Confirmatory Document page.

I. Technical Specification:

The bidders must confirm that their offers are as per technical specifications for Mechanical, Electrical and Civil works provided in NIT/ Tender Document and their offers are unconditional. Bidders must submit a declaration on-line in this respect as per **Annexure- B.**

J. Technical Data sheet:

The bidder must agree and submit Technical Data Sheet on line as per **Annexure – I**

Note: There must not be any discrepancy between the online submitted information and uploaded scanned copy of the documents.

7. Check List of documents to be uploaded by bidders:

Scanned copy of the following documents tabulated below must be uploaded by all bidders during online submission of the bid under Part-I)

Sl No	Eligibility Criteria	Information to be furnished by bidder on line	Scanned copy of documents, to be uploaded in support of information/declaration furnished online by the bidder against Eligibility Criteria as Confirmatory Document
1	Earnest Money Deposit (Ref. Clause No. 3 of NIT)	-	Bidder will have to upload the document regarding UTR number before submission of bid.
2	Legal Status of the bidder	Confirmation in the form of Yes/NO for possessing the supporting documents	<u>Any one of the following document:</u> 1. Affidavit or any other document to prove proprietorship / Individual status of the bidder 2. Partnership deed containing name of partners 3. Memorandum & Article of Association with certificate of incorporation containing name of bidder 4. In case of JOINT VENTURE:

			<p>a. Details of all partners as at 1/2/3 (as applicable above).</p> <p>b. JOINT VENTURE agreement as per Performa.(Annexure-N).</p>
3	Contractor's bid / Letter of Bid	Confirmation in the form of Yes/NO	<p>Contractor's Bid and Acceptance of Bid Conditions on bidder's letter head as per Performa given at Annexure-A of the bid document.</p> <p>In case of Joint Venture the above document is to be signed by all the partners.</p>
4	Declaration (Ref. Clause No. 6 I of NIT)	Confirmation in the form of Yes/NO	<p>A declaration on bidder's letter head as per proforma given at Annexure-B of Tender Document.</p> <p>In case of Joint Venture, the declaration is to be signed by all partners.</p>
5	An Undertaking on bidder's letter head in support of the authenticity of submitted information and documents and other commitments	Confirmation in the form of Yes/NO.	<p>An undertaking is to be given as per format given in the bid document. Undertaking is about the genuineness of the information furnished on-line, authenticity of the scanned copy of documents uploaded and about other commitments.</p> <p>Annexure-C</p> <p>In case of Joint Venture, undertaking shall be signed by all partners.</p>
6	Valid Digital Signature Certificate	Confirmation in the form of Yes/NO for possessing the supporting documents	<p>If the bidder himself is the DSC holder bidding on-line then no document is required.</p> <p>However, if the DSC holder is bidding online on behalf of the bidder then the Power of Attorney or any sort of legally acceptable document for the authority to bid on behalf of the bidder.</p>

7	Mandate Form for Electronic Fund Transfer	-	E- Mandate form duly filled in as per Performa of Annexure-D
8	THE WORK EXPERIENCE: (Ref. Clause No. 6 A of NIT)	<ul style="list-style-type: none"> i) Start date & end date of each qualifying experience (similar nature) ii) Work Order Number/ Agreement Number of each experience iii) Name & address of Employer/Work Order Issuing authority of each experience iv) Percentage (%) share of each experience (100%) in case of an Individual/proprietorship firm or a partner in a partnership firm or and the actual % of share in case of a Joint Venture/Consortium). v) Executed Value of work against each experience vi) Name of similar nature of work executed (as shown in the work order 	<p>Satisfactory Work Completion Certificate along with work order issued by employer against the Experience of similar work containing all the information as sought on-line.</p> <p>BOQ and / or TDS may be sought during clarification or along with deficient documents</p>
9	Financial Turnover (Ref. Clause No. 6 B of NIT)	<ul style="list-style-type: none"> 1. Annual turnover of each of the last 3 years ending 31st March of the previous financial year. 2. Name of the Chartered Accountant issuing the Profit and Loss A/c or the Turnover 	<p>Financial Turnover Certificate for last 3 financial years certified by a Practicing Chartered Accountant having a membership number with Institute of Chartered Accountants of India, containing the information as furnished by bidder on- line.</p> <p>Note: In case of JOINT VENTURE, financial turnover certificate of each</p>

		<p>Certificate.</p> <p>3. Membership number of the Chartered accountant.</p> <p>4. Date of issue of Financial Turnover Certificate by Chartered Accountant</p>	<p>partner be given.</p>
10	The Availability of Working Capital(Ref. Clause No. 6 C of NIT)	<p>I. Amount of available working capital inclusive of lines of credit and availability of other financial resources</p> <p>II. Date on which the bidder possesses the required working capital</p> <p>III. Name of the Chartered Accountant (CA)</p> <p>IV. Membership Number of CA who certifies the bidder's working capital on a particular date.</p> <p>V. Date of Issue of Certificate</p> <p>VI. In case the bidder is a Joint Venture (JV), the above information in respect of each individual partner of Joint Venture may be furnished and the working capital of all partners will be added to calculate the Working Capital of the</p>	<p>1. Certificate of Working Capital issued by a Practicing Chartered Accountant having a membership number with Institute of Chartered Accountants of India containing the information as furnished by bidder on- line. Such certificate should contain UDIN No.</p> <p>2. Banker's certificate if any</p> <p>Note: In case of JOINT VENTURE, above document of each partner be given.</p>

		bidder.	
11	Valid Permanent Account Number (PAN) (Ref. Clause No. 6 D of NIT)	Confirmation in the form of Yes/NO for possessing the supporting documents	PAN card issued by Income Tax department, Govt. of India (In case of JOINT VENTURE, PAN card for each Indian partner of Joint Venture and verifiable Tax Residency Certificate of respective country for each foreign partner or Joint Venture itself)
12	Certificate of registration issued by provident fund authorities (Ref. Clause No. 6 E of NIT)	Confirmation in the form of Yes/NO for possessing the supporting documents	Certificate of registration issued by provident fund authorities in favor of bidder (In case of JOINT VENTURE, Certificate of registration issued by provident fund authorities for each individual partner of JOINT VENTURE)
13	Deleted	Deleted	Deleted
14	<p>Goods and Service Tax (Not Applicable for Exempted Services)</p> <p>The bidder should be either GST Registered Bidder/Dealer</p>	Confirmation in the form of Yes/No regarding possessing of required document as enlisted in NIT with respect to GST status of the bidder.	<p>The following documents depending upon the status w.r.to GST as declared by Bidder in the BOQ sheet:</p> <p>Status: GST registered Bidder/Dealer (but not under composition scheme):</p> <p>Document: GST Registration Certificate (i.e. GST identification Number) issued by appropriate authority of India.</p> <p><u>[In case of JV a Certificate from a practicing Chartered Accountant having membership number with Institute of Chartered Accountants of India confirming the status of JV w.r.to GST in compliance with relevant GST rules or GST Registration Certificate of JV]</u></p> <p><u>Note:</u>In case the work/service is</p>

			awarded to a Joint Venture participating in the tender they have to submit GST registration (as applicable in the tender and for the bidder status) etc. in the name of the Joint Venture after Award of Work/Service at the time of execution of agreement/ before the payment of first running on account bill.
15	Integrity Pact	Confirmation in the form of Yes/NO towards acceptance of Integrity Pact as per format given in Annexure-H .	Digitally signed scanned copy of Integrity Pact as per format given in Annexure-H
16	Technical Data sheet / Technical Parameter Sheet (Ref. Clause 6 J Of NIT)	Bidder must agree and submit Technical Data Sheet online as per Annexure – I	Technical Data Sheet will be downloaded by the bidder and he will furnish all the required information on this Excel file. Thereafter, the bidder will upload the same Excel file during bid submission in General Technical Evaluation (GTE).
17	Any other document to support the qualification information as submitted by bidder on-line.		

Note:

1. Only one file in .pdf format can be uploaded against each eligibility criteria. Any additional/ other relevant documents to support the information/declaration furnished by bidder online against eligibility criteria may also be attached by the bidder in the same file to be uploaded against respective eligibility criteria.
2. After evaluation by the system, the confirmatory documents of all the bidders will be downloaded and further evaluated. The price bids of only those bidders shall be opened who will qualify after evaluation of Information supported by documents.

8 SUBMISSION OF BID:

- 8.1 All the bids are to be submitted online in the e-procurement portal of CIL <https://coalindiatenders.nic.in>. No bid shall be accepted off-line.
- 8.2 In order to submit the Bid, the bidders have to get themselves registered online on the e-Procurement portal of CIL <https://coalindiatenders.nic.in> with valid Digital Signature Certificate

(DSC) of minimum class-II type (with signing & encryption certificate) issued from any agency authorized by Controller of Certifying Authority (CCA), Govt. of India which can be traced up to the chain of trust to the root certificate of CCA.

The online Registration of the Bidders on the portal will be free of cost and one-time activity only.

The registration should be in the name of bidder, whereas DSC holder may be either bidder himself or his duly authorized person.

The Joint Venture has to enroll as a separate bidder in its own name & style.

- 8.3 The bidder shall refer the home page of e-tendering portal of CIL <https://coalindiatenders.nic.in> for online registration and online bidding and may further seek assistance from the help desk team (details are available in the portal).
- 8.4 The bidder shall refer Bidder Manual Kit/Help for Contractors/Information about DSC/FAQ and other sections in home page of e-tendering portal of CIL <https://coalindiatenders.nic.in>.
- 8.5 The bidders will have to accept unconditionally the online User Portal Agreement which contains the acceptance of all the Terms and Conditions of NIT including General and Special Terms & Conditions, Integrity Pact and other conditions, if any, along with online undertaking in support of the authenticity of the declarations regarding the facts, figures, information and documents furnished by the Bidder online in order to become an eligible bidder. No conditional bid shall be allowed/accepted. This User Portal Agreement will be a part of NIT/Contract Document.
- 8.6 If any information/declaration furnished online by the bidder against eligibility criteria is found to be wrong at any stage which changes the eligibility status of the bidder penal action as mentioned in Annexure-C will be applicable.
- 8.7 Bidder will have to submit EMD as per clause no 3 of NIT.
- 8.8 The qualification in bid will also be subject to the receipt and acceptance of EMD within schedule date and time as mentioned in the NIT. BCCL shall not be responsible for any delay in receipt of EMD.
- 8.9 The information will be provided by the bidder by filling up relevant data through a form in an objective and structured manner. The software will use the information provided by the bidders to evaluate the technical bid automatically.
- 8.10 If the bidder himself is the DSC holder bidding on-line, then no document is required. However, if the DSC holder is bidding online on behalf of the bidder then the Power of Attorney or any sort of legally acceptable document for the authority to bid on behalf of the bidder.

8.11 For online submission of tender the bidders will have to upload “Letter of Bid”, all the confirmatory documents as prescribed in the NIT and Technical Parameter Sheet (TPS) (if applicable) in Cover-I and only “Price-bid” in Cover-II.

i) **Letter of Bid:** The format of Letter of Bid (as given in the **Annexure-A of Tender Document**) will be downloaded by the bidder and will be printed on Bidder’s letter head and the scanned copy of the same will be uploaded during bid submission in Cover-I. This will be the covering letter of the bidder for his submitted bid. The content of the “Letter of Bid” uploaded by the bidder must be the same as per the format downloaded from website and it should not contain any other information.

The Letter of bid will be digitally signed by DSC holder submitting bid online and it does not require any physical signature. However, if the Letter of Bid (LoB) bears the physical signature in addition to the digital signature of DSC holder, it will be accepted without questioning the identity of person signing the Letter of Bid.

ii) **Technical Parameter Sheet (TPS) (If applicable):** The Technical Parameter Sheet containing the technical specification parameters for the tendered work/service will be in Excel format (password protected). This will be downloaded by the bidder and he will furnish all the required information on this Excel file. Thereafter, the bidder will upload the same Excel file during bid submission in General Technical Evaluation (GTE). The Technical Parameter Sheet which is incomplete and not submitted as per instruction given above will be rejected.

iii) **Confirmatory Documents:** All the confirmatory documents as enlisted in the NIT in support of online information submitted by the bidder are to be uploaded in Cover-I by the bidder while submitting his/her bid.

iv) **Price bid:** The Price bid containing the Bill of Quantity will be in .xls format (password protected). This will be downloaded by the bidder and he will quote the rates for all items on this Excel file. Thereafter, the bidder will upload the same Excel file during bid submission in Cover-II. The Price-bid will be in Item Rate BOQ format and the bidder will have to quote for all the tendered items and the L-1 will be decided on overall quoted value (i.e. Cost to company). The Price-bids of the tenderers will have no condition. The Price Bid which is incomplete and not submitted as per instruction given above will be rejected.

8.12 If there is any change in the contents of Letter of Bid uploaded by bidder as compared to the format of Letter of Bid uploaded by the department with NIT document, then the bid will be rejected. However, inclusion of any additional redundant information by the Bidder in the submitted Letter of Bid (LOB), which does not contradict the content and spirit of original format of LOB uploaded by department will not be a cause of rejection of his/her bid.

8.13 It is the bidder’s responsibility to comply with the system requirement i.e. hardware, software and internet connectivity at bidder’s premises to access the e-tendering portal. Under any circumstances, BCCL shall not be liable to the bidders for any direct/indirect loss or damages

incurred by them arising out of incorrect use of the e-tender system or internet connectivity failures.

9 OPENING OF BID AND EVALUATION OF TENDER:

A.OPENING OF BID

i. Opening of Technical bid: The Technical bid (Cover-I) will be opened one day after the Bid submission end date or next working day whichever is later. Technical bid (Cover-I) will be decrypted and opened online by the “Bid Openers” with their Digital Signature Certificates on the prescheduled date & time of Tender Opening.

ii. The e-Procurement System will evaluate the Technical bids automatically on the basis of relevant data provided by bidder through a form in an objective and structured manner while submitting bid. If the parameter given by bidder in objective and structured manner does not confirm to required eligibility criteria as specified in the tender document then the bid will be rejected.

iii. All the documents uploaded by bidder(s) including i.e. Letter of Bid & EMD exemption documents (if any) and the Evaluation sheets generated by the system online shall be downloaded after opening of Technical bid (Cover-I). After decryption and opening of Technical bid (Cover-I) the “technical bid opening summary” will be uploaded on the same day.

B .Technical Evaluation of Tender:

i. After opening of Technical bid, the documents submitted by bidder(s) in cover I as enlisted in the NIT will be downloaded by the Evaluator and shall be put up to the Tender Committee. The Tender Committee will examine the uploaded documents against information/declarations furnished by the bidder(s) online. If it confirms to all of the information/ declarations furnished by the bidder online and does not change the eligibility status of the bidder then the bidder will be considered eligible for award of Contract.

ii. In case the Tender Committee finds that there is some deficiency in uploaded documents corresponding to the information furnished online or in case corresponding document have not been uploaded by bidder(s) then the same will be specified online by Evaluator clearly indicating the omissions/shortcomings in the uploaded documents and indicating start date and end date allowing 7 days (7 x 24 hours) time for online re-submission by bidder(s). The bidder(s) will get this information on their personalized dashboard under “Upload confirmatory document” link. Additionally, information shall also be sent by system generated email and SMS, but it will be the bidder’s responsibility to check the updated status/information on their personalized dash board regularly after opening of bid. No separate communication will be required in this regard. Non-receipt of e-mail and SMS will not be accepted as a reason of non-submission of documents within prescribed time. The bidder(s) will upload the scanned copy of all those specified

documents in support of the information/ declarations furnished by them online within the specified period of 7 days. If the bidder(s) fails to submit the specified document/s in 7(Seven) days (7 x 24 hours). No further document shall be sought from Bidder.

iii. It is responsibility of Bidders to upload legible/clearly readable scanned copy of all the required documents as mentioned above.

iv. The tender will be evaluated on the basis of documents uploaded by bidder(s) online. The bidder(s) is/are not required to submit hard copy of any document through offline mode. Any document submitted offline will not be given any cognizance in the evaluation of tender.

v. In case the bidder(s) submit(s) requisite documents online as per NIT, then the bidder(s) will be considered eligible for opening of Price Bid.

vi. In case bidder(s) fails to confirm the online submitted information(s)/ declaration(s) by the submitted documents as (ii) above, their/his bid shall be rejected; however, if the confirmatory documents do not change eligibility status of the bidder in connection his submitted online information(s)/declaration(s), then his/their bid will be accepted for opening of Price Bid.

vii. After Technical evaluation of tender, "Technical Evaluation Summary" will be uploaded by the evaluator and date and time of price bid opening shall be notified online.

viii. In case none of the bidder(s) complies the technical eligibility criteria as per NIT, then bidder(s) will be rejected online and re-tender (if required) will be done (with the same or different quantity, as per the instant requirement)

ix. After opening of price bid, the bid history showing all the valid bids offered along with name of the bidders shall be published. All bidders shall have the facility to see and get a print of the same for their record.

x. Conditional discounts shall not be considered. If a bidder offers a discount unilaterally after submission of bid, the discount shall not be considered for evaluation of offers but shall be availed if order is placed on such tenderer.

xi. If the lowest price received after opening of price bid is unreasonable or it is unacceptable on ground of being too high or too low compared with estimated price, the management reserves right to seek justification of the price from lowest bidder. If the price is not considered reasonable, management may not accept such bid and go for another tender process.

xii. In case of disruption of service at the service provider's end during opening of the Price Bid, due to any technical snag or otherwise attributable to the system failure at the server end, the price bid will open on a different date which will be notified online.

xii. If L1 bidder backs out, the EMD will be forfeited and the bidder will be debarred for minimum one(1) year from participating in tenders in CIL/Subsidiary

10. Tender Status:

It will be the bidder's responsibility to check the status of their Bid online regularly, after the opening of bid till award of contract. Additionally, information shall also be sent by system generated e-mail and SMS at nodal points (Date of bid opening, Requisition for Clarification on Confirmatory document from L-1 bidder, award of work etc.). No separate communication will be required in this regard. Non-receipt of e-mail and SMS will not be accepted as a reason of non-submission of Confirmatory documents within prescribed time. The Tender Status will be in public domain and anyone visiting the site can view it by identifying the tender.

11. Bid Validity:

The validity of bids shall be not less than **120 (one hundred twenty)** days after the end date of submission of bid considering all extensions, if there.

12. Modification and Withdrawal of Bid:

1. Modification of the submitted bid shall be allowed online only before the deadline of submission of tender and the bidder may modify and resubmit the bid online as many time as he/she may wish.
2. Bidders may withdraw their bid online within the end date of bid submission and their EMD will be refunded. However, if the bidder once withdraws his bid, he will not be able to resubmit the bid in that particular tender.
3. For withdrawal of bid after the end date of bid submission, the bidder will have to make a request in writing to the Tender Inviting Authority. Withdrawal of bid may be allowed till issue of work order/LOA with the following provision of penal action:
 - a. If the request of withdrawal is received before online notification for opening of price bid, the EMD will be forfeited and bidder will be debarred for 1 (one) year from participating in tenders in CIL/Subsidiary. The Price-bid of remaining bidders will be opened and the tender process shall go on.
 - b. If the request of withdrawal is received after online notification for opening of price bid, the EMD will be forfeited and the bidder will be debarred for minimum 1 (one) year from participating in tenders in CIL/Subsidiary. The Price-bid of all eligible bidders including this bidder will be opened and action will follow as under:
 - i) If the bidder withdrawing his bid is other than L 1, the tender process shall go on.
 - ii) If the bidder withdrawing his bid is L-1, then re-tender will be done. If L1 bidder backs out, the EMD will be forfeited and the bidder will be debarred for minimum one(1) year from participating in tenders in CIL/Subsidiary.

- 4 The standard operating procedure to handle withdrawal of bid after end date of submission shall be as follows:

I. The Mode of Withdrawal:

A. Online Withdrawal of Bids:

- a. The system of online withdrawal is available on the portal up to end date of bid submission, where any bidder can withdraw his/her bid which will attract no penal action from department side.
- b. The system of online withdrawal beyond end date of bid submission and till award of contract is also available but not fully functional and under development stage. Once it is developed and implemented only online withdrawal shall be considered except for some exceptional cases as mentioned in clause below.

B. Offline Withdrawal of Bids:

- a. A partner of bidder (in case of JOINT VENTURE and partnership firms) whose DSC is registered on the e-Procurement portal can access the portal for online withdrawal but when there is a split in the business relationship, the partners whose DSC is not registered on the portal do not have the option of online withdrawal of bid. Hence such partners may opt to use offline method of withdrawal of his/her offer (or express his disassociation from the bidder organization).
- b. Till a fully functional system of online withdrawal of bid (beyond end date of bid submission and till award of contract) is not developed and implemented, offline withdrawal shall also be considered.

5. Acceptance of withdrawal: The Company will decide:

- a. Whether the request for withdrawal of offer has been received from right source and authentic. For this purpose, a letter is to be sent by registered post/speed post to the bidder on the address as given by him in the enrollment page of e-Procurement portal, allowing 10 days' time to confirm the withdrawal. If the bidder does not confirm the withdrawal within the stipulated period, then it should be construed that there is no withdrawal of bid. In case the withdrawal/disassociation from the firm (Joint Venture or Partnership firm) has been submitted by any other partner then also the confirmation has to be sought from the bidder and if bidder wants to deny the withdrawal/disassociation from the JOINT VENTURE or the partnership firm then the bidder shall be required to furnish a legally acceptable document signed by all the partners of the firm to substantiate his claim.
- b. Whether the withdrawal is due to the reason other than to support any mala fide intention of any participating bidder such as participating or supporting a cartel formation etc.
- c. If the mala fide intentions in the withdrawal are apprehended then the tender should be cancelled apart from other penal action as specified in 3(a) & (b) above.
- d. If no mala fide intentions in the withdrawal are apprehended then the penal action as specified in

3(a) & (b) above shall be taken.

13. The Company reserves the right to postpone the date of receipt and opening of tenders or to cancel the tenders without assigning any reason whatsoever.
14. This Tender Notice shall be deemed to be part of the Contract Agreement.
15. The Company does not bind itself to accept the lowest bid and reserves the right to reject any or all the bid without assigning any reasons whatsoever and to split up the work between two or more tenderers or accept the tender in part and not in its entirety, at its sole discretion.
16. Any corrigendum/date extension etc. in respect of this tender shall be issued on our website <https://coalindiatenders.nic.in> only. No separate notification shall be issued in the press. Bidders are therefore requested to visit said portal regularly to keep them updated.
In exceptional situations in case of any disruption of service in e-Procurement portal infrastructure or EMD payment infrastructure, for a considerable period, an extension of end date of Bid submission for a period of 1-3 working days may be done after normal resumption of services. Bid opening date will correspondingly be extended. This extension shall be effected by Application Administrator or by the Portal Service Provider for all the tenders which are affected or likely to be affected due to such disruption of services/infrastructure.

Such corrigendum/date extension etc. in respect of this tender, if issued, will become the part of Tender Document.

17. Canvassing in connection with the tenders in any shape or form is strictly prohibited and tenders submitted by such Bidders who resort to canvassing shall be liable for rejection.
18. The tenderer shall have to ensure implementation of CMPF/EPF, as applicable, in respect of the workers deployed by him.
19. Matters relating to any dispute or difference arising out of this tender and subsequent contract awarded based on this tender shall be subject to the jurisdiction of District Court, Dhanbad.

20. Integrity Pact:

The bidders must accept the Integrity Pact as per format at **Annexure-H** of tender document. Digitally signed copy of Integrity Pact shall also be uploaded as mentioned in clause no 7 of NIT.

Names and addresses of the Independent External Monitor:

1. Name: Shri Aditya Prakash Mishra, IRSE(Retd.);
Address: Flat no. 24, Aster-1, Vatika City, Sohna Road, Sector 49L, Gurgaon, Hararyana-122003
E-mail ID: apmishra53@gmail.com
2. Name: Shri GoutamSen, IDAS(Retd.);
Address: Flat No. : I-081, Vedanta, Gurugram – Sector – 108,Hararyana – 122001.
E-Mail ID: gautamsen1976@gmail.com

The IEM have been appointed by the Central Vigilance Commission (CVC).

21 Service Provider: Service Provider for this tender will be NIC.

Help Line at NIC: 0120- 4001 002/ 0120- 4200 462

0120-4001 005/ 0120 – 6277 787

E-mail id: support-eproc@nic.in

Help Desk at BCCL (On working day at working hours)

Level – V, KoylaBhawan, Koyla Nagar,

BCCL, Dhanbad-826005

Contact Person: Mr. Tanmay Ball

Mobile No: 07866002586

E-mail id: bcclcmceprocurement@gmail.com

The bidder shall refer Bidder Manual Kit/Help For Contractors/ Information about DSC/FAQ and other sections in home page of e-tending portal of CIL <https://coalindiatenders.nic.in>

22 Procurement & Sourcing of Goods and Services for the Project

BCCL will follow and comply with the “Public Procurement (Preference to Make in India), order 2017” as per office order No. P-45021/2/2017-B.E.-II dated 15.06.2017 of Department of Industrial Policy and Promotion, Ministry of Commerce and Industry, Govt. of India and any other instruction(s) or order(s) issued by the appropriate Government in this regard. The Bidder shall also abide by any applicable order(s) or instruction(s) issued by Govt. of India for compliance in this regard.

**Sd/-
General Manager
Contract Management Cell**

Copy to:

1. D(T) OP /D(T) P&P /D(F) /D(P)/CVO, BCCL- for kind information.
2. Name: **Shri Aditya Prakash Mishra, IRSE(Retd.);**
Address: Flat no. 24, Aster-1, Vatika City, Sohna Road, Sector 49L, Gurgaon, Harayana-122003
E-mail ID: apmishra53@gmail.com
3. Name: **Shri GautamSen, IDAS(Retd.),**
Flat No. I-081,Vedanta, Gurugram-sector 108, Haryana-122001
Email: gautamsen1976@gmail.com.
3. TS to CMD for Kind Information of CMD, BCCL

Distribution through e-mail.

1. GM (Co-ordn.)/GM(WCD)/ GM(F) I/C / GM(MM)/ GM(M&S) / GM(E&M)/ GM (System)/ GM(IE)/GM(Estate)/RD,RI-II CMPDIL /HOD (P&P)/HOD(Survey)/HOD (Envt), Koyla Bhawan, BCCL.
2. All GMs in the Areas including Washery Zones for wide circulation through display in the Notice Boards.
3. GM (Contract Management Cell),CIL/ ECL/WCL/CCL/SECL/NCL/MCL
4. GM (P-Admn) with a request to display this order in Koyla Bhawan Notice Boards
5. PRO, BCCL, for Necessary actions, Please.
6. Sri R K Choubey, Sr. DEO / Sri B N Banerjee, Jr. DEO, CMC Deptt. – To upload this notice in BCCL Website.
7. NIC Help Desk, Level-V, Koyla Bhawan-service Provider for e-tendering for CMC for uploading in the portal.

SECTION -2

INSTRUCTIONS TO BIDDERS

1. SCOPE OF BIDDER

- 1.1 The Bharat Coking Coal Limited (referred to as Employer in these documents) invites bids for the work(s) on Turnkey basis as mentioned in the Bid Notice. The Bidders should submit Bids for all the works mentioned in the NIT / Tender Document.
- 1.2 The successful Bidder will be expected to complete the Work(s) by the Intended Completion period specified in the Bid document/Notice.

2. ELIGIBLE BIDDERS

- 2.1 The Invitation for Bid is open to all Bidders including an individual, proprietorship firm, partnership firm, company registered under Companies Act, any legal entity or Joint Ventures. The bidders shall be eligible to participate only if they fulfill the qualifying/eligibility criteria specified in e-tender Notice. In a tender, a bidder shall participate in one bid only.
- 2.2 A Firm that has been engaged by the Employer to provide consulting services for the preparation or supervision of the Works shall not be eligible to Bid.
- 2.3 Joint Venture: Two or three companies/ contractors may jointly undertake contract/contracts. Each entity will be jointly and severally responsible for completing the task as per the contract. The format for Joint Venture Agreement is enclosed as **Annexure-N**.

Joint Venture details:

Name of all partners of a Joint Venture (not more than 3):

1. Lead partner
2. Partner
3. Partner

Joint Venture must comply the following requirements:

- i) Minimum qualification requirements for Joint Venture:
 - a) The qualifying criteria parameter e.g. experience of the individual partners of the J.V will be as deliberated under Clause '6A' of e-tender notice towards fulfillment of qualification criteria related to experience.
 - b) The qualifying criteria parameter e.g. financial resources (turnover and working capital) of the individual partners of the J.V. will be added together, for the relevant period, and the total criteria should not be less than as deliberated under Cl.6(B) and 6(C) of e-tender notice towards fulfillment of qualification criteria related to financial turnover.

- ii)** The formation of Joint Venture or change in the Joint Venture character/ partners after submission of the bid and any change in the bidding regarding Joint Venture will not be permitted.
- iii)** The bid, and in case of a successful bid - the agreement, shall be signed so as to legally bind all partners jointly and severally and any bid shall be submitted with a copy of the Joint Venture Agreement providing the joint and several liabilities with respect to the contract.
- iv)** The pre-qualification of a Joint Venture does not necessarily pre-qualify any of its partners individually or as a partner in any other Joint Venture or association. In case of dissolution of a Joint Venture, each one of the constituent firms may pre-qualify if they meet all the pre-qualification requirements, subject to written approval of the employer.
- v)** The bid submission must include documentary evidence to the relationship between Joint Venture partners in the form of Joint Venture Agreement to legally bind all partners jointly and severally for the proposed agreement which should set out the principles for the constitution, operation, responsibilities regarding work and financial arrangements, participation (percentage share in the total) and liabilities (joint and several) in respect of each and all of the firms in the Joint Venture. Such Joint Venture Agreement must evidence the commitment of the parties to bid for the facilities applied for (if pre-qualified) and to execute the contract for the facilities if their bid is successful.
- vi)** One of the partners shall be nominated as 'In-charge' of the contract and shall be designated as Lead Partner. This authorization shall be evidenced by submitting with the bid a Power of Attorney signed by legally authorized signatories of all the partners.
- vii)** The Joint Venture Agreement must provide that the Lead Partner shall be authorized to incur liabilities and receive instructions for and on behalf of any and all partners of the Joint Venture and the entire execution of the contract shall be done with active participation of the Lead Partner.
- viii)** The contract agreement should be signed by each Joint Venture Partners. Subsequent declarations/letters/documents shall be signed by lead partner authorized to sign on behalf of the Joint Venture or authorized signatory on behalf of Joint Venture.
- ix)** Deleted.
- x)** An entity can be a partner in only one Joint Venture. Bid submitted by Joint Venture including the same entity as partner will be rejected.
- xi)** The Joint Venture agreement may specify the share of each individual partner for the purpose of execution of this contract. This is required only for the sole purpose of apportioning the value of the contract to that extent to individual partner for subsequent submission in other bids if he intends to do so for the purpose of the qualification in that Bid.
- xii)** The earnest money / bids security bank guarantee must be submitted by the Joint Venture.

xiii) The Joint Venture agreement must specifically state that it is valid for the project for which bidding is done. If Joint Venture breaks up midway before award of work and during bid validity period bid will be rejected.

If Joint Venture breaks up midway before award of work and during bid validity/after award of work/during pendency of contract, in addition to normal penalties as per provision of bid document, all the partners of the Joint Venture shall be debarred from participating in future bids for a minimum period of 12 months.

xiv) Joint Venture agreement shall be registered in accordance with law so as to be legally valid and binding on the members before making any payment.

xv) Joint Venture shall open a bank account in the name of Joint Venture and all payments due to the Joint Venture shall be credited by employer to that account only. To facilitate statutory deductions all statutory documents like PAN/GSTIN etc. in the name of the Joint Venture shall be submitted by Joint Venture before making any payment.

2.3 The bidders shall have valid Digital Signature Certificate (DSC) of minimum class-II type (with signing & encryption certificate) issued from any agency authorized by Controller of Certifying Authority (CCA), Govt. of India which can be traced up to the chain of trust to the root certificate of CCA.

2.4 The bidders have to accept unconditionally the online user portal agreement which contains the acceptance of all the Terms and Conditions of NIT and ITB, including General and Special Terms & Conditions, technical specifications, other conditions, if any, along with on-line undertaking in support of the authenticity of the declarations regarding the facts, figures, information and documents furnished by the bidder on-line in order to become an eligible bidder.

2.5 The Company reserves its right to allow Public Enterprises purchase preference facility as admissible under prevailing policy.

2.6 No sub-letting of the work as a whole by the contractor is permissible. Prior permission is required to be taken from the principle employer for engagement of sub-contractors in part work/piece rated work.

3. QUALIFICATION OF THE BIDDER

3.1 In the event that pre-qualification of potential bidders has been undertaken, only bids from pre-qualified bidders will be considered for award of contract.

3.2 If the employer has not undertaken pre-qualification of potential bidders, all bidders shall fulfill the eligibility / qualifying criteria as detailed at clause 3, 6 & 7 of e-tender Notice. In addition, the bidders shall also fulfill technical requirements to make them eligible. Such details shall be submitted as deliberated at e-tender Notice.

3.3 If the bidder is subsidiary of a company, the experience and resources of the holding company or its other subsidiaries will not be taken into account. However, if the bidder is a holding

company, the experience and resources of its wholly owned subsidiaries will be taken into consideration.

3.4 Even though the bidders meet the above eligibility/qualifying criteria, they are subject to be disqualified if they have:

- a. Made misleading or false representations in the forms, statements and attachments submitted in proof of the qualification requirements.

Notes: The documents to be furnished by the bidder to prove that he is satisfying the qualification criteria laid down should all be in the bidder's name except in cases where though the name has changed, owners continued to remain the same and in cases of amalgamation of entities and when a holding company relies on credential of its wholly owned subsidiary.

4. ONE BID PER BIDDER

4.1 Each Bidder shall submit only one Bid, either individually, or as a partner in a partnership firm or a partner in a Joint Venture or a Public Ltd./ Private Ltd. company. A Bidder who submits or participates in more than one Bid (other than as a subcontractor or in cases of alternatives that have been permitted or requested) will cause all the proposals with the Bidder's participation to be disqualified.

5. COST OF BIDDING

5.1 The Bidder shall bear all costs associated with the preparation and submission of his Bid, and the Employer will in no case be responsible or liable for those costs.

6. SITE VISIT

6.1 The Bidder, at the Bidder's own responsibility, cost and risk, is encouraged to visit and examine the Site of Works and its surroundings, approach road, soil condition, investigation report, existing works, if any, connected to the tendered work, drawings connected to the work, if / as available and obtain all information that may be necessary for preparing the Bid and entering into a contract for execution of the Works. The costs of visiting the Site shall be at the Bidder's own expense.

6.2 It shall be deemed that the Bidder has visited the site/area and got fully acquainted with the working conditions and other prevalent conditions and fluctuations thereto whether he actually visits the site/area or not and has taken all the factors into account while quoting his rates.

6.3 The bidder is expected, before quoting his rate, to go through the requirement of materials / workmanship, specification, requirements and conditions of contract.

6.4 The bidder, in preparing the bid, shall rely on the site investigation report referred to in the bid document (if available), supplemented by any information available to the bidder.

7. CONTENT OF BIDDING DOCUMENTS

7.1 The set of bidding documents comprises the documents (all or as available/applicable) listed below:

- (i) e-Tender Notice,
- (ii) Instructions to Bidders, contractors bid and undertaking
- (iii) Conditions of Contract (General Terms & Conditions, Additional Terms and conditions, General technical conditions, Erection conditions of contract, Safety norms etc.),
- (iv) Special Terms & Conditions (Technical, Specifications and Scope of work)
- (v) Tender drawing
- (vi) Integrity Pact,
- (vii) Various Forms of Securities, form of Article of Agreement, etc.
- (viii) Bill of Quantities,
- (ix) e-Tender User Portal Agreement,

8. CLARIFICATION OF BIDDING DOCUMENTS

8.1 Prospective bidder requiring any interpretation or clarification of bidding document may seek clarification online within the specified period as per NIT or during pre-bid meeting (if any). The identity of the bidder will not be disclosed by the system. The department will clarify as far as possible only the relevant queries of bidders within specified period as per NIT. The clarifications given by department will be visible to all the bidders intending to participate in that tender.

9. AMENDMENT OF BIDDING DOCUMENTS

- 9.1 Before the deadline for submission of Bids, the Employer may modify the bidding documents by issuing addenda.
- 9.2 Any addendum thus issued shall be a part of the bidding document and shall be displayed in the website. The bidder shall upload the same during bid submission.
- 9.3 To give prospective Bidders reasonable time in which to take an addendum into account in preparing their Bids, the Employer shall extend, as necessary, the deadline for submission of Bids, in accordance with Sub-clause 15.2 below.

10. LANGUAGE OF BID

10.1 All documents relating to the Bid shall be in the English language.

11. BID PRICES

11.1 The bidder shall closely study all specification in detail and scope of work which govern the rate/ amount he is quoting. The contract shall be for the whole Works as described in Sub Clause 1.1 above, based on the scope of work as detailed in the bidding document.

- 11.2 The price bid containing the bill of quantity will be in excel format and will be downloaded by the bidder and he will quote the rates for all items/heads/sub-heads on this excel file as detailed at **8.11 (iv)** of e-tender notice.
- 11.3 All duties, taxes (excluding Goods and Services Tax (GST) only) and other levies, royalty, building and construction workers cess (as applicable in States) payable by the bidder/Contractor under the Contract, or for any other cause as applicable on the last date of submission of Bid, shall be included in the rates, prices and the total Bid Price submitted by the Bidder. Applicable GST either payable by bidder or by company under reverse charge mechanism shall be computed by system in BOQ sheet as per predefined logic.

All investments, operating expenses, incidentals, overheads, leads, lifts, carriages, tools and plants etc. as may be attendant upon execution and completion of works shall also be included in the rates, prices and total Bid price submitted by the bidder.

However, such duties, taxes, levies etc. which is notified after the last date of submission of Bid and/or any increase over the rate existing on the last date of submission of Bid shall be reimbursed by the company on production of documentary evidence in support of payment actually made to the concerned authorities.

Similarly, if there is any decrease in such duties, taxes and levies, the same shall become recoverable from the contractor. The details of such duties, taxes and other levies along with rates shall be declared by the bidder.

The item wise rate quoted by bidder shall be inclusive of all taxes, duties & levies but excluding GST & GST Compensation Cess, if applicable. The payment of GST and GST Compensation Cess by service availer (i.e. CIL/Subsidiary) to bidder/contractor (if GST payable by bidder/contractor) would be made only on the latter submitting a Bill/invoice in accordance with the provision of relevant GST Act and the rules made thereunder and after online filing of valid return on GST portal. Payment of GST & GST Compensation Cess is responsibility of contractor.

However, in case contractor is GST unregistered bidder/dealer in compliance with GST rules, the bidder/dealer shall not charge any GST and/or GST Compensation Cess on the bill/invoice. In such case, applicable GST will be deposited by CIL/Subsidiary directly to concerned authorities.

Input tax credit is to be availed by CIL/subsidiary as per rule.

If CIL/Subsidiary fails to claim Input Tax Credit(ITC) on eligible Inputs and Capital Goods or the ITC claimed is disallowed due to failure on the part of supplier/vendor of goods and services in incorporating the tax invoice issued to CIL/Subsidiary in its relevant returns under GST, payment of CGST & SGST or IGST, GST (Compensation to State) Cess shown in tax invoice to the tax authorities, issue of proper tax invoice or any other

reason whatsoever, the applicable taxes &cess paid based on such Tax invoice shall be recovered from the current bills or any other dues of the supplier/vendor along with interest, if any.

11.4 The rates and prices quoted by the Bidder shall be fixed for the duration of the contract and shall not be subject to variations on any account except to the extent variations allowed as per the conditions of the contract of the bidding document.

12. CURRENCIES OF BID AND PAYMENT

12.1 The unit rates and prices shall be quoted by the Bidder entirely in Indian Rupees.

13. BID VALIDITY

13.1 The validity of bids shall be not less than **120 (one hundred twenty)** days after the end date of submission of bid considering all extensions, if there. A bid valid for a shorter period shall be rejected by the Employer.

13.2 In exceptional circumstances, prior to expiry of the original time limit, the Employer may request that the bidder(s) extend the period of validity for a specified additional period. The request and the bidder's response shall be in writing. A bidder may refuse the request without forfeiting his bid security. A bidder agreeing to the request will not be required or permitted to modify his bid but will be required to extend the validity of his bid security for the period of extension, and in compliance with Clause 14 of ITB in all respects.

14. BID SECURITY / EARNEST MONEY DEPOSIT

14.1 The bidder shall furnish, as part of his bid, a Bid Security/Earnest Money of the amount as shown in e-tender notice and in the form as deliberated at Clause 3 of e-tender notice.

14.2 Any Bid not accompanied by an acceptable Bid Security/EMD shall be rejected by the employer as nonresponsive.

14.3 The EMD of rejected bidders will be refunded at any stage directly to the account from where it had been received (except the cases where EMD is to be forfeited).

14.4 The Bid Security / EMD of successful bidder may be retained and adjusted with performance security / security deposit at bidder's option.

14.5 The Bid Security/Earnest Money may be forfeited:

- a. If the Bidder withdraws the Bid after the end date of Bid submission during the period of Bid validity / extended validity with mutual consent; or
- b. In the case of a successful Bidder, if the Bidder fails within the specified time limit to:
 - i. Sign the Agreement; **or**
 - ii. Furnish the required Performance Security/ Security Deposit; **or**

iii. If the L-1 bidder does not accept the rate quoted by him .

Additionally, the company reserves the right to debar such defaulting contractor from participating in future bids for a minimum period of 12(twelve) months.

14.6 The Bid Security/ EMD deposited with the Employer will not carry any interest.

15. DEADLINE FOR SUBMISSION OF BIDS

15.1 Bids shall be submitted on line on the e-tendering portal of Coal India Limited <https://coalindiatenders.nic.in> within the date and time specified in the e-tender notice.

15.2 The employer may extend the deadline for submission of bids by issuing a corrigendum in accordance with provisions of e-tender notice/ITB, in which case all rights and obligations of the employer and the bidders previously subject to the original deadline will then be subject to the new deadline.

16. SIGNING AND SUBMISSION OF BID

16.1 The contractors bid will be digitally signed by DSC holder submitting bid online and it does not require any physical signature. However, if the Contractor's bid bears the physical signature in addition to the digital signature of DSC holder, it will be accepted without questioning the identity of person signing the bid.

16.2 Submission of bid shall be as detailed at **clause 7 & 8** of e-tender notice.

17. MODIFICATION AND WITHDRAWAL OF BIDS

Modification and withdrawal of bid shall be guided by clause 12 of e-Tender Notice under the heading "Modification and withdrawal of bid".

18. BID OPENING

18.1 All bids are to be submitted on line only on the e-tendering portal of CIL <https://coalindiatenders.gov.in>

18.2 After successful submission of bid the Employer will open the bid as specified under **clause 9 of e-tender notice**.

19. CLARIFICATION OF BIDS

19.1 To assist in the examination, evaluation, and comparison of Bids, the Employer may, at the Employer's discretion, ask any Bidder for online clarification of the Bidder's Bid (uploaded document). The request for clarification on bidder's bid shall be online.

The bidder shall upload digitally signed scanned copy of required document/response within the date specified online. No further extension for submission shall be allowed.

The bidder will get clarification notice on their personalized dash board under '**upload confirmatory document**' link. Additionally, information shall also be sent by system generated email and SMS, but it will be bidder's responsibility to check the updated status/information on their personalized dash board at least once daily after opening of Part-I. No separate

communication will be required in this regard. Non receipt of email or SMS will not be accepted as reason for non-submission of clarification documents within prescribed time.

19.2 No document uploaded / presented by the bidder after closing date and time of submission of Bid will be considered unless otherwise called for during scrutiny /evaluation and shall be against online request only.

20 EVALUATION AND COMPARISON OF BIDS

20.1 Evaluation and comparison of Bids will be done by System on-line. The bidder shall also comply with system requirement as explained wherever in e-tender notice/tender document. Bid evaluation shall be done after taking into consideration overall quoted price by the bidder and effect of Goods and Services Tax (GST), GST Compensation Cess etc. as applicable. L1 will be decided on the basis of Cost to Company.

20.2 If the Bid of the successful Bidder is seriously unbalanced in relation to the Company's estimate of the cost of work to be performed under the contract, the Employer may require the Bidder to produce detailed price analysis for any or all items of the Bill of Quantities, to demonstrate the internal consistency of those prices with the methods and schedule proposed.

20.3 The tender will be evaluated on the basis of documents uploaded by bidders online. The bidders are not required to submit hard copy of any document through offline mode. Any document submitted offline will not be given any cognizance in the evaluation of tender.

20.4 In case the L1 bidder submits requisite documents online as per NIT and fulfills NIT requirement, then the bidder will be considered eligible for award of work/contract.

20.5 In case the L1 bidder fails to submit requisite documents online as per NIT or if any of the information/declaration furnished by L1 bidder online is found to be wrong by Tender Committee during evaluation of scanned documents uploaded by bidder, which changes the eligibility status of the bidder, then his bid shall be rejected and EMD of L1 bidder will be forfeited..

20.6 In case the L1 bidder is technically eligible but rejection is due to high rate quoted by him/her then the tender shall be cancelled and retendered.

20.7 In case none of the bidder complies the technical requirement, *then re-tender* will be done.

20.8 It is responsibility of Bidders to upload legible/ clearly readable scanned copy of all the required documents as mentioned above.

20.9 The following penalty shall be imposed on the defaulting bidders:

Sl. No	Situation	Penal Provisions
(i)	L-1 bidder is a defaulter	100% of EMD is forfeited.

Note: 1. The zone of applicability of above penal provisions shall be subsidiary specific.

2. The penal provisions will be squarely applicable to all those firms whose documents are examined on account of treating them as L-1 successively.

20.10 Technical Evaluation by System:

- a. Work Experience:** As per clause no. 6(A) of e-NIT.
- b. Financial Turnover:** As per clause no. 6(B) of e-NIT
- c. Working Capital:** As per clause no. 6(C) of e-NIT
- d. Permanent Account Number:**
 - i. The system will evaluate “Yes” as eligible and “No” as not eligible.
- e. Deleted**
- f. Certificate of registration with provident fund authorities:**
 - i. The system will evaluate “Yes” as eligible and “No” as not eligible.
- g. Goods and Service Tax (Not Applicable for Exempted Goods/Services) Confirmation** in the form of Yes/No regarding possessing of required document as enlisted in NIT with respect to GST status of the bidder.
 - i. The system will evaluate “Yes” as eligible and “No” as not eligible.
- h. User Portal Agreement:**
 - i. System will capture data in the Agree/Disagree format from the bidder and will decide the eligibility.
- i. Expected values of each of the General Technical Evaluation(GTE) items**
System will capture data in the **YES/NO** format from the bidder and will decide the eligibility.

21. AWARD CRITERIA

21.1 Subject to Clause 22 of ITB, the Employer will award the Contract to the best qualified Bidder whose Bid has been determined to be substantially responsive to the Bidding documents and who has offered the lowest evaluated Bid Price, provided that such Bidder has been determined to be:

22. EMPLOYER'S RIGHT TO ACCEPT ANY BID, NEGOTIATE AND TO REJECT ANY OR ALL BIDS

22.1 Notwithstanding Clause 21, the Employer reserves the right to accept, negotiate or reject any Bid, and to cancel the bidding process and reject all Bids, at any time prior to the award of Contract, without thereby incurring any liability to the affected Bidder or Bidders or any obligation to inform the affected Bidder or Bidders of the grounds for the Employer's action.

23. NOTIFICATION OF AWARD AND SIGNING OF AGREEMENT

23.1 The Bidder, whose Bid has been accepted, will be notified of the award by the Employer prior to expiration of the Bid validity period in writing by email and confirmed by registered letter. This letter (hereinafter and in the Conditions of Contract called the "Letter of Acceptance") will state the sum that the Employer will pay the Contractor in consideration of the execution and completion of the Works by the Contractor as prescribed by the Contract (hereinafter and in the Contract called "the Contract Price").

23.2 The notification of award will constitute the formation of the Contract. The work should be completed within the period specified in the NIT from expiry of 30 (thirty)-days from the issue of letter of acceptance issued by department or within 7 days of handing-over of the site, whichever is later.

23.3 The Agreement will incorporate all agreements between the Employer and the successful Bidder, work program etc. within 60(sixty) days following the notification of award along with the letter of Acceptance and / or Work Order issued by department.

In case of failure to submit performance security and **enter** in to agreement in specified period or extended period, on written request of contractor, if any, the department in addition to other penal measures as per clause 14.5 of ITB shall debar the selected bidder from participating in re-tender. In addition, the department may debar the bidder from participating in future bids for at least **12** months.

23.4 In the bidding process, the cause of rejection of Bid of any bidder should be intimated to non-qualified bidder after the award of the work to the successful one. The Security / Earnest Money shall be refunded to unsuccessful bidders as per provision of Cl. 14.3 of ITB.

23.5 The contractor shall enter into and execute contract agreement in the prescribed form. The cost of the stamp papers for the contract agreement shall be borne by the contractor. Two sets of contract document/agreements shall be prepared and signed by both the parties. One of the sets shall be stamped "Original" and the other "Duplicate". The duplicate copy and one additional copy will be supplied to the contractor free of cost and the original is to be retained by the company. For any additional copy, additional cost to be charged. All additional copies should be certified by the Engineer-in-Charge.

23.6 The contractor shall keep copy of these documents on the site/place of work in proper manner so that these are available for inspection at all reasonable times by the Engineer-in-charge, his representatives or any other officials authorized by the company for the purpose.

The contract document shall not be used by the contractor for any purpose other than this contract and the contractor shall ensure that all persons employed for this contract strictly adhere to this and maintain secrecy, as required of such documents.

24. PERFORMANCE SECURITY/SECURITY DEPOSIT

24.1 Security Deposit shall consist of two parts:

- a) Performance Security to be submitted at award of work and
- b) Retention Money to be recovered from running bills.

The security deposit shall bear no interest.

For details refer Cl. 3.0 of Condition of Contract (General Terms and Conditions) Sub-Section 3.1

25. EMPLOYMENT OF LABOUR

25.1 Contractors are to employ, to the extent possible (as per policy decision of the company valid from time to time), local project affected people and pay wages not less than the minimum wages as per minimum Wages Act of Central or state govt. (whichever is higher) or HPC wages of CIL as applicable and mentioned in NIT.

Payment of Provident Fund for the workmen employed by him for the work as per the Law prevailing under provision of CMPF/EPF and allied scheme valid from time to time shall be responsibility of the contractor.

In all the cases mentioned above, the contractor needs to ensure that the employee has become a member of any of the provident fund as the case may be and the unique membership number of the CMPF/EPF or Allied Scheme needs to be submitted to Employer.

In addition to the above, the Contractor shall provide a copy of the updated passbook having entry made in the CMPF/EPF or Allied Scheme(s) of Provident fund as the case may be by the competent authority annually /as and when asked. Bidder shall also submit copies of statutory returns.

Note:

However, if the basic rate of wages of labour as fixed by CIL (i.e. with respect to HPC wages) is revised during the contract period then the incremental difference shall be reimbursed on actual basis through a suitable mechanism as decided by CIL/Subsidiary.

25.2 The Contractor shall comply with statutory requirements of various acts including Child Labour (Prohibition & Regulation) Act, 1986 as amended from time to time and all rules, regulations and schemes framed there under from time to time in addition to other applicable labour laws.

25.3 The payment to the contractor's labourers has to be made through Bank only.

25.4 Bonus is to be paid to the contract workers engaged by the Contractors as per the provisions of Payment of Bonus Act, 1965 as amended from time to time.

25.5 The contractors shall register themselves on the Contract Labour Payment Management Portal (CLPMP) of CIL within 30 days of issue of work order and will have to enter and update periodically the following details in the portal:

a. Work Order details

b. Details of Contractor workers and payment of wages in respect of each Work Order each month.

25.6 All the contract workers shall be covered with the Bio-metric attendance system for payment of wages.

25.7 Contractors should deploy suitably experienced workers as mentioned in relevant Govt. circular.

NOTE: In case company decides/ circulates separate wages for such works within mine premises, the same may be allowed based on appropriate circular. Clause 25.1 shall stand amended to this extent before notification of bid.

26. LEGAL JURISDICTION

26.1 Matter relating to any dispute or difference arising out of this tender and subsequent contract awarded based on the bid shall be subject to the jurisdiction of **Dhanbad Court** only.

27. DEEMED EXPORTS

27.1 If the bidder has quoted any item/ items under the deemed exports then it will be the responsibility of the Bidder to get all the benefits under deemed exports from the Government.

The Company's responsibility shall only be limited to the issuance of required certificates. The quotation of the Bidder will be unconditional and phrases like "Subject to availability of deemed exports benefit" will not find place in it.

28. CONSULTANTS NOT TO BID & VICE-VERSA:

28.1 A firm which has been engaged by the Company to provide Goods or Works for a project or any of its affiliates will be barred from providing consultancy services for the same project. Conversely, a firm hired to provide consultancy services for the preparation or implementation of a project and any of its affiliates will be barred from subsequently providing Goods or Works or services related to the initial assignment for the same project.

29. SUB-CONTRACTOR/ SUB-VENDOR:

29.1 The contractor shall specify major items of supply or services for which he proposes to engage Sub-contractor(s)/ Sub-Vendor (s) in its bid.

Further, the installation/ usage of major equipment /product shall meet the following conditions:

1. Indigenously manufactured with BIS/ ISI marking wherever it is mandatory or conforming to BIS standards or ISO certification etc or reputed brand in that order.
2. Overseas manufactured with certification regarding quality like relevant ISO/British Standard Certification/ any other International quality certification etc. Failing which internationally reputed brand in that order.

The major items/ equipment/ products so specified by the bidder shall be incorporated in the Contract Document. The contractor may from time to time propose any addition or deletion from the list as mentioned in the contract document and will inform the Engineer in Charge/ Designated Officer in Charge with proper justification so as not to impede the progress of work.

The same may be accepted by Engineer in Charge/ Designated Officer in Charge. However, such approval of the Engineer-in Charge/ Designated Officer in Charge will not relieve the contractor from any of his obligation, duties and responsibilities under the contract.

Any addition of item(s) in the list shall also meet the conditions specified at 1 & 2 above.

29.2 If a contractor submits his bid, qualifies and does not get the contract because of his not being the lowest, he will be prohibited from working as a sub-contractor for the contractor who is executing the work.

30. e-payment

The bidders have to furnish the details of their bank A/c Nos. Name and Address of the Bank and Branch Code along with the Bid. Successful bidders/Bidders are required to submit an Authorization form duly signed for e-payment to them. Enclosed Annexure –D (Mandate form) be filled in and submitted along with the Bid.

31. Integrity Pact

Bidders are required to submit the pre-contract integrity pact duly signed, witnessed and uploaded as per enclosed format (Annexure – H) along with the bid Part-I/Cover-I. This will be signed by the authorized signatory of the bidder(s) with name, designation and seal of the company. Bidders who do not sign the pact shall be disqualified from participation in the Bid process.

32. Changes in Firms Constitution to be intimated

Previous approval in writing of the Engineer-in-Charge shall be obtained before any change is made in the constitution of the Firm. If previous approval is not obtained the same will be treated as a breach of contract.

33. Miscellaneous.

- 33.1 The bidders should fill the bid document properly and carefully. They should avoid quoting absurd rates.
- 33.2 The contractor will have to submit valid H.T. Electrical Contractor's license issued by the electrical licensing board of state of execution or electrical contractor's license issued by any Indian state duly recognized/endorsed by electrical licensing board of state of execution before execution of agreement.
- 33.3 After opening of the Tender if the company decides to negotiate, the tender should be in a position to depute their representative, at short notice, with full authority for negotiation on technical and other matters.
- 33.4 Throughout the bidding documents, the terms 'bid' and tender and their derivatives are synonymous.
- 33.5 The processes for entering into the agreement with the successful bidder will be done offline as per the prevailing manual system. However, the documents required to be submitted by contractor for executing the agreement shall be as specified in the bid document.
- 33.6 Instruction to bidder shall be part of the contract agreement.

34. PROCESS TO BE CONFIDENTIAL

Information relating to the examination, clarification, evaluation and comparison of Bids and recommendations for the award of a contract shall not be disclosed to Bidders or any other persons not officially concerned with such process until the award to the successful bidder has been announced. Any effort by a Bidder to influence the Employer's processing of Bids or award decisions may result in the rejection of his Bid.

35. The Company reserves its right to allow Public Enterprises purchase preference facility as admissible under prevailing policy.

36. No sub-letting of the work as a whole by the contractor is permissible. Prior permission is required to be taken from the principle employer for engagement of sub-contractors in "Hiring of Equipment"/ "Transport" contract for part work / piece rated work.

37. REVOCATION OF TENDER PROCESS:

There may be situation when the decision of Tender Committee may have to be changed subsequently on account of a Court's verdict. Also, there may be circumstances when online evaluation of tender is not done correctly due to mistake by the Evaluator or due to technical error in the system, which may lead to cancellation of tender.

In order to avoid the cancellation of tender in such cases, the tender process needs be reverted back to appropriate stage (i.e. bid Opening stage etc.) to comply with the Court's verdict or to rectify the error committed by the Evaluator. This provision in the e-Procurement system has been introduced with an objective to abide by the Court's verdict or to ensure that the tender

process should not suffer due to any mistake committed by an individual or due to any technical error in the system.

Revocation of Tender process back to Technical-bid opening stage or Price-bid opening stage from an advanced stage shall be done under the following circumstances:

- a. To comply with the directives of Hon'ble Court of Law.
- b. If the Evaluator makes a mistake in online evaluation of tender, which is not in line with the Tender Committee decision.
- c. If there is an error in the online evaluation of tender due to technical error in the system.

Revocation of Tender process will be done with the specific approval of the concerned Director.

In all such cases the Tender Revocation Notice must contain the details of the circumstances leading to revocation of tender process.

The Revocation of Tender on the e-Procurement portal can be done by way of creation and publication of corrigendum. However, since Revocation of Tender, in true sense, is not a Corrigendum to NIT, the Tender Revocation Notice will be uploaded only on the e-Procurement portal <https://coalindiatenders.nic.in>.

In case of revocation of Tender at any stage the auto-refund of EMD may not work properly and in such case it may be required that Tender Inviting Authority to arrange refund of EMD through conventional system of refund of EMD.

38. CANCELLATION OF TENDER:

Any tender published on the e-Procurement portal must be concluded to its logical end i.e. either "Award of Contract" or "Cancellation of Tender" or "Retender".

The Tender Cancellation Notice must contain the details of the circumstances leading to cancellation of tender.

The Cancellation of Tender on the e-Procurement portal can be done by way of creation and publication of corrigendum. However, since Cancellation of Tender, in true sense, is not a Corrigendum to NIT, the Tender Cancellation Notice will be uploaded only on the e-Procurement portal <https://coalindiatenders.nic.in>.

All the details of technical bid and price bid will be kept preserved in the archives for auditing purposes and the same can be accessed with special authorization. The IP address of all the bidders who has participated in the bid along with timing and date will also be kept preserved in the system.

SECTION -3
CONDITIONS OF CONTRACT

SUB-SECTION – 3.1
GENERAL TERMS AND CONDITIONS
OF
CONTRACT

SUB-SECTION – 3.1

GENERAL TERMS AND CONDITIONS OF CONTRACT

1. DEFINITIONS:

- i. The word "Company" or "Employer" or "Owner" wherever occurs in the conditions, means the Bharat Coking Coal Limited, Koyla Bhawan Complex, Dhanbad represented at the headquarters of the Company by the Chairman-cum-Managing Director or his authorized representative or any other officer specially deputed for the purpose.
- ii. The word "Principal Employer" or "Engineer" wherever occurs, means the authorized representative or any other officer specially deputed by the Company for the purpose of contract.
- iii. The word "Contractor"/"Contractors" or "Manufacturer" wherever occurs means the successful Bidder/Bidders who has/have deposited the necessary Earnest Money and has/have been given written intimation about the acceptance of tender and shall include legal representative of such individual or persons composing a firm or a company or the successors and permitted assignees of such individual, firm or company, as the case may be.
- iv. "The Site" shall mean the site of the contract work including land and any building and erections thereon and any other land allotted by the company for contractor's use in the performance of the contract.
- v. The term "sub-contractor", as employed herein, includes those having a direct contract with contractor either on piece rate, items rate, time rate or on any other basis and it includes one who furnishes work to a special design according to the plans or specifications of this work but does not include one who merely supplied materials.
- vi. "Consulting Engineer"/"Consultant" shall mean any firm or person duly appointed as such from time to time by the owner.
- vii. 'Accepting authority' shall mean the management of the company and includes an authorized representative of the company or any other person or body of persons empowered in this behalf by the company.
- viii. A 'Day' shall mean a day of 24 hours from midnight to midnight.
- ix. Engineer-in-charge/Designated Officer-in-charge will be clearly defined in the contract document. Engineer-in-charge/Designated Officer-in-charge who is of an appropriate seniority will be responsible for supervising and administering the contract, certifying payment due to the contractor, valuing variations to the contract, awarding extension of time and valuing compensation events. Engineer-in-charge/Designated Officer-in-charge may further appoint his representatives i.e. another person/ Project Manager or any other competent person and notify to the contractor who is directly responsible for supervising the work being executed at the site, on his behalf under the Delegation of Powers of the

company. However, overall responsibility, as far as the contract is concerned will be that of the Engineer-in-charge/Designated Officer-in-charge.

- x. The 'contract' shall mean the notice inviting tender, the tender as accepted by the company and the formal agreement executed between the company and the contractor together with the documents referred to therein including conditions of contract, special conditions, if any, specifications, designs & drawings including those to be submitted during progress of work, scope of work, billing schedule/schedule of quantities with rates and amounts. Until the formal agreement is signed between the Owner and Contractor, LOA/Work Order together with Contract Document, shall constitute the Contract.
- xi. The 'works' shall mean and include the furnishing of equipment, labour, and the services in accordance with the contract or parts thereof as the case may be and shall also include all extra or additional, altered or substituted works or any work of emergent nature, which in the opinion of the Engineer-in-charge, become necessary during the progress of the works to obviate any risk or accident or failure or become necessary for security.
- xii. "Specification" shall mean the technical specifications forming a part of the contract and such other schedules and drawings as may be mutually agreed upon.
- xiii. 'Contract price' shall mean the total sum for which tender is accepted by the company.
- xiv. 'Written notice' shall mean a notice or communication in writing and shall be deemed to have been duly served if delivered in person to the individual or to a member of the firm or to an office of the Corporation/Company for whom it is intended, or if delivered at or sent by registered mail to the last business address known to him who gives the notice.
- xv. "Letter of Acceptance" of the tender shall mean the official notice issued by the company notifying the contractor that his tender has been accepted.
- xvi. "Date of Contract" shall mean the date on which both the parties have signed the contract agreement.
- xvii. "Manufacturer's Works' or Contractor's Works" shall mean the place of work used by the Manufacturer, the Contractor, their collaborators or sub-contractors for the performance of the works.
- xviii "Inspector" shall mean the Owner or any person nominated by the Owner from time to time, to inspect the equipment stores or Works under the contract and/or the duly authorized representative of the owner.
- xix. When the words "Approved", "Subject to Approval", "Satisfactory", "Equal to", "Proper", "Requested", "As directed", "Where directed", "When directed", "Determined by", "Accepted", "Permitted", or words and phrases of like import are used, the approval, judgment, direction etc. is understood to be a function of the Owner/Engineer/Engineer-in-Charge.
- xx. "Test of Completion" shall mean such tests as prescribed in the contract to be performed by the contractor before the Works is taken over by the Owner.

- xxi. "Start-up" shall mean the time period required to bring the equipment covered under the Contract from an inactive condition, when construction is essentially complete, to the state ready for trial operation. The start-up period shall include preliminary inspection and check out of equipment and supporting sub-systems; initial operation of the complete equipment covered under the Contract to obtain necessary pre-trial operation data, perform calibration and corrective action; shut down inspection and adjustment prior to the trial operation period.
- xxii. "Initial operation" shall mean the first integral operation of the complete equipment covered under the contract with sub-systems and supporting equipment in service.
- xxiii. "Trial Operation", "Reliability Test", "Trial Run", "Complete Test" shall mean the extended period of time after the "Start-up" period. During this trial operation period the unit shall be operated over the full load range. The length of Trial Operation shall be as determined by the Engineer, unless otherwise specified elsewhere in the Contract.
- xxiv. "Performance and Guarantee Tests" shall mean all operation checks and tests required to determine and demonstrate capacity, efficiency, and operating characteristics as specified in the contract document.
- xxv. "Commercial Operation" shall mean the condition of operation in which the complete equipment covered under the contract is officially declared by the owner to be available for continuous operation at different loads upto and including rated capacity. Such declaration by the owner however, shall not relieve or prejudice any of the contractor's obligation under this contract.
- xxvi. "Final Acceptance" shall mean the owner's written acceptance of the works performed under the contract, after successful completion of performance and guarantee tests.
- xxvii "Guarantee Period/ Maintenance Period" shall mean the period during which the contractor shall remain liable for repair or replacement of any defective part of the works performed under the contract.
- xxviii "Drawings"/"Plans" shall mean all :
- (a) drawings furnished by the owner/consultant as a basis for proposals,
 - (b) supplementary drawings furnished by the Owner/Consultant to clarify and to define in greater detail the intent of the contract,
 - (c) drawings submitted by the contractor with his proposal provided such drawings are acceptable to the Owner/Consultant,
 - (d) drawings furnished by the Owner/Consultant to the Contractor during the progress of the work, and
 - (e) engineering data and drawings submitted by the Contractor during the progress of the work provided such drawings are acceptable to the Engineer,
- xxix "Codes" shall mean the following, including the latest amendments, and/or replacements, if any :

- (a) Standards of Bureau of Indian Standards relevant to the works under the contract and their specifications.
 - (b) Other Internationally approved Standards and/or rules and regulations touching the subject matter of the contract.
 - (i) A.S.M.E. Test codes.
 - (ii) A.I.E.E. Test codes.
 - (iii) American Society of Materials Testing Codes.
 - (iv) Indian Electricity Act and Rules and Regulations made thereunder.
 - (v) Indian Explosive Act and Rules and Regulations made thereunder.
 - (vi) Indian Petroleum Act and Rules and Regulations made thereunder.
 - (vii) Indian Mines Act and Rules and Regulations made thereunder.
 - (c) Any other laws, rules, regulations and Acts applicable in the country with respect to labour, safety, compensation, insurance etc.
- xxx Words importing singular only shall also include the plural and vice-versa where the context so requires.
- xxxi Words importing "Person" shall include firms, companies, corporations, and associations or bodies of individuals, whether incorporated or not.
- xxxii Terms and expressions, not defined herein, shall have the same meaning as are assigned to them in the Indian Sale of Goods Act, failing that in the Indian Contract Act, and failing that in the General Clauses Act.
- xxxiii "Commissioning" the plant/project shall mean completion in all respects of construction rendering the plan/project ready for performance test and commercial operation as per xxv.
- xxxiv "Government Approvals" shall mean all permits, licenses, authorizations, consents, clearances, decrees, waivers, privileges, approvals from and filing with government instrumentalities necessary for the development, construction and operation of the plant/project.
- xxxv "Month" shall mean a calendar month according to the Gregorian calendar.

2. CONTRACT DOCUMENTS:

The following documents shall constitute the contract documents:

- (i) Articles of Agreement,
- (ii) Notice Inviting Tender,
- (iii) Letter of Acceptance of Tender indicating deviations, if any, from the conditions of contract incorporated in the Bid / Tender Documents issued to the bidder and/ or the Bid submitted by the bidder,
- (iv) Conditions of contract, including general terms and conditions, additional terms and conditions, technical terms and conditions, erection terms and conditions, special conditions, if any etc. forming part of the Agreement.
- (v) Specifications, where it is part of Tender Documents,

- (vi) Scope of works/ Bills of quantities/ schedule of works/ quantities and
- (vii) Contract Drawings/ finalized work programme.

- 2.1 After acceptance of tender the Contractor shall be deemed to have carefully examined all Contract Documents to his satisfaction. If he shall have any doubt as to the meaning of any portion of the Contract Documents, he shall before signing the Contract, set forth the particulars thereof, and submit them to the Owner in writing in order that such doubt may be removed. The Owner will provide such clarifications as may be necessary in writing to the Contractor. Any information otherwise obtained from the Owner or the Engineer shall not in any way relieve the Contractor of his responsibility to fulfill his obligations under the Contract.
- 2.2 The Contractor shall enter into a Contract Agreement with the Owner within 60 (sixty) days from the date of 'Acceptance of Tender' or within such extended time as may be granted by the owner. The performance Bank Guarantee for the proper fulfillment of the contract shall be furnished by the contractor in the prescribed form within 30 (thirty) days of 'Acceptance of tender'. The performance Guarantee shall be as per terms prescribed in Clause 3 below.
- 2.3 The owner, after the issue of the Letter of Acceptance of Tender, will send one copy of the final agreement to the contractor for his scrutiny and approval.
- 2.4 The agreement, unless otherwise agreed to, shall be signed within 60 (sixty) days of the issue of the letter of Acceptance of tender, at the office of the owner on a date and time to be mutually agreed. The contractor shall provide for signing of the contract, performance guarantee in copies as required, appropriate power of attorney and other requisite materials. In case it is agreed mutually that the contract is to be signed beyond the stipulated time, the bid guarantee submitted with the tender will have to be extended accordingly.
- 2.5 The agreement will be signed in six originals and the contractor shall be provided with one signed original and the rest will be retained by the owner. None of these documents shall be used by the contractor for any purpose other than this contract and the contractor shall ensure that all persons employed for this contract strictly adhere to this and maintain secrecy, as required of such documents.
- 2.6 The contractor shall provide free of cost to the owner all the engineering data, drawings and descriptive materials submitted with the bid, in at least six (6) copies to form a part of the contract immediately after issue of letter of acceptance.
- 2.7 Subsequent to signing of the contract, the contractor at his own cost shall provide the owner with at least 6 (six) true copies of agreement within 30 (thirty) days after the signing of the contract.
- 2.8 The contract shall be considered as having come into force from the date of signing of the agreement or handing over the site whichever is later.
- 2.9 The laws applicable to this contract shall be the laws in force in India. The courts of Dhanbad, India shall have exclusive jurisdiction in all matters arising under this contract.

- 2.10. The total scope of supply and works & services shall be split up into two contracts - one covering the supply part and the other covering the works & services part. Both contracts will contain a cross fall breach clause specifying the breach of any one contract will also constitute breach of the other contract and the whole contract combined..

3.0 CONTRACT PERFORMANCE GUARANTEE/SECURITY DEPOSIT:

3.1 Security Deposit shall consist of two parts;

- a) Performance Security to be submitted at award of work and
- b) Retention Money to be recovered from running bills.

The security deposit shall bear no interest.

3.1.1 Performance Security should be 5% of contract amount and should be submitted by the successful bidder within 21 days of issue of LOA in any of the form given below after which bid security/earnest money will be refunded to the contractor.

- a. Bank Guarantee in the form given in the bid document from any schedule bank acceptable to the owner. Bank guarantee issued by out station bank shall be operative at their local branch **at Dhanbad** or their branch **at Kolkata**.
- b. Govt. Securities, FDR or any other form of deposit stipulated by the owner and duly pledged in favour of owner.
- c. Demand Draft drawn in favour of **Bharat Coking Coal Limited** on any Scheduled Bank payable at its Branch **at Dhanbad**.

The Earnest Money/ Bid Security deposited shall be discharged when the Bidder signed the Agreement and furnished the required Performance Security/ 1st part of security deposit.

The bid security deposited may be adjusted against the Performance security at bidder's option.

Work shall commence only after submission of Performance Security and Additional Performance Security, if any.

3.1.2 If performance security is provided by the successful bidder in the form of bank guarantee it shall be issued either -

- (a) at Bidder's option by a Scheduled Bank as per provisions of cl. 3.1.1. The BG shall contain complete postal address, telephone number, fax number and email address of both out station bank issuing the BG as well as its local operating branch.
- (b) by a foreign bank located in India and acceptable to the employer.

The Bank Guarantee issued by the Issuing Bank on behalf of the contractor in favour of "Bharat Coking Coal Limited" shall be in paper form as well as issued under "Structured Financial

Messaging System (SFMS)”. The details of beneficiary for issue of BG under SFMS platform is furnished below:

Name of Beneficiary & his details	Name	Bharat Coking Coal Limited
	Area/HQ	BCCL (HQ)
	Bank Account No.	35160317947
	Department	FUND (HQ)
Beneficiary Bank, Branch & Address	State Bank of India	
	Main Branch, Dhanbad	
IFSC Code	SBIN0000066	

Above particulars are to be incorporated by the issuing bank properly, while issuing BG under SFMS mode to avoid any problem in future.”

Original Copy of the Bank Guarantee issued by the Issuing Bank shall be sent by the Issuing Bank/applicant to concerned department and Area of BCCL.

This procedure has to be followed also in case of extension or amendment to the original BG-

3.1.3 Retention Money should be deducted at 5% from running bills. Total of performance security and Retention Money should not exceed 10% of contract amount.

Retention Money may be released against Irrevocable Bank Guarantee (BG) of equivalent amount from any Scheduled Bank drawn in favour of “Bharat Coking Coal Limited” payable at its branches at Dhanbad/ Kolkata with minimum validity of 90 (Ninety) days after the end of Guarantee Period in the format given in the Bid Document as Annexure-K.

3.1.4 The Guarantee amount shall be payable to the Employer without any condition whatsoever.

3.1.5 Performance Security/Retention Money shall be converted into Performance Guarantee on successful completion of work in accordance with contract and upon satisfactory PG Test.

Performance security/ Retention Money/ security deposit submitted in the form of BG which shall be valid for 90 days after the end date of scheduled completion and to be extended for minimum period of 1(One) year in one instance which must cover a time period of 90 days beyond completion of Defect Liability period.

3.1.6 The Performance Guarantee shall cover additionally the following guarantees to the Employer:

(a) The successful bidder guarantees the successful and satisfactory operation of the equipment furnished and erected under the contract, as per the specifications and documents,

(b) The successful bidder further guarantees that the equipment provided and installed by him shall be free from all defects in design, material and workmanship and shall upon written notice from the employer fully remedy free of expenses to the Employer such defects as developed under the normal use of the said equipment within the period of guarantee specified in the relevant clause of the Conditions of Contract.

- 3.1.7 The Contract Performance Guarantee is intended to secure the performance of the entire Contract. However, it is not construed as limiting the damages under clause entitled 'Equipment Performance Guarantee' in section Technical Conditions of Contract and damages stipulated in the other clauses in the bidding documents.
- 3.1.8 All Bank Guarantees are to be submitted in the format prescribed by the company in the bid document. Bank Guarantee shall be irrevocable and it shall be from any Scheduled Bank acceptable to the owner. The BG issued by outstation bank shall be operative at its local branch at Dhanbad or branch at Kolkata.
- 3.1.9 The Company shall be at liberty to deduct/appropriate from the Contract Performance Guarantee/Security Deposit such sums as are due and payable by the contractor to the company as may be determined in terms of the contract, and the amount appropriated from the Contract Performance Guarantee/Security Deposit shall have to be restored by Contractor subsequently.
- 3.1.10 Performance Security deposit shall be returned to the Contractor after successful completion of 3 (Three) years of Defect Liability Period without any interest. The balance SD i.e. Retention Money shall be released without any interest after successful completion of entire period of the Defect Liability. Any defect/defects in the work, if detected during Guarantee Period/Defect Liability Period shall be rectified or equipment/ system shall be replaced to the satisfaction of the engineer In-charge within the said defect liability/operation/maintenance guarantee period or its due extension till completion of the rectification/ replacement works as required.
- 3.1.11 In case the successful bidder fails to submit the Performance security within the stipulated time then the award of work shall be cancelled with forfeiture of the bid security/ earnest money.

Additionally, the company shall ban such defaulting contractor as per the guidelines of Banning of business of CIL. In case of JV/Partnership firm, the debarment shall also be applicable to all individual partners of JV/Partnership firm.

4.0 ASSIGNMENT AND SUBLETTING OF CONTRACT

4.1 The contractor may, after informing the engineer in charge/ designated officer in charge, with proper justification for acceptance, assign or sub-let the contract or any part thereof other than for raw materials, for minor detail or any part of the plant for which makes are identified in the contract document. Suppliers of the equipment/system not identified in the contract document or any change in the identified supplier mentioned in the contract document can be changed and same may be informed to engineer in charge/ designated officer in charge, with proper justification for acceptance. The experience list of the equipment/system vendors under consideration by the contractor for this contract over the list mentioned in the contract document shall be furnished to the engineer in charge/ designated officer in charge prior to procurement of all such items/ equipment. Such assignment of sub-letting shall not relieve the contractor from any obligation, duty or responsibility under the contract. Any assignment as above without prior information of engineer shall be void.

4.2 For components/equipment procured by the contractors for the purposes of the contract, after obtaining the written approval of the owner, the contractor's purchase specifications and enquiries shall call for quality plans to be submitted by the suppliers along with their proposals. The quality plans called for from the vendors shall set out, during the various stages of manufacture and installation, the quality practices and procedures followed by the vendor's quality control organization, the relevant reference documents/standards used, acceptance level, inspection documentation raised, etc. Such quality plans of the successful vendor shall be discussed and finalized in consultation with the engineer and shall form a part of the purchase order/contract between the contractor and the vendor. Within 3 weeks of the release of the same purchase order/contracts for such bought out items/ components, a copy of the same without price details but together with detailed purchase specifications, quality plans and delivery conditions shall be furnished to the engineer by the contractor.

5.0 PATENT RIGHTS AND ROYALTIES

5.1 Royalties and fees for patent covering materials, articles, apparatus, devices, equipment or processes used in the works shall be deemed to have been included in the contract price. The contractor shall satisfy all demands that may be made at any time for such royalties or fees and he alone shall be liable for any damages or claims for patent infringements and shall keep the owner indemnified in that regard. The contractor shall, at his own cost and expense, defend all suits or proceedings that may be instituted for alleged infringement of any patent involved in the works, and, in case of an award of damages, the contractor shall pay for such

award. In the event of any suit or other proceedings instituted against the owner, the same shall be defended at the cost and expense of the contractor who shall also satisfy/comply and decree, order or award made against the owner. But it shall be understood that no such machine, plant, work, material or thing has been used by the owner for any purpose or any manner other than that for which they have been furnished and installed by the contractor and specified under these specifications. Final payment to the contractor by the owner will not be made while any such suit or claim remains unsettled. In the event any apparatus or equipment, or any matter thereof furnished by the contractor, is in such suit or proceedings held to constitute infringement, and its use is enjoined, the contractor shall, at his option and at his own expense, either procure for the owner, the right to continue use of said apparatus, equipment or part thereof, replace it with non-infringing apparatus or equipment or modify it, so it becomes non-infringing.

6.0 TIME - THE ESSENCE OF CONTRACT

- 6.1 The time and the date of completion of the works as stipulated in the contractor's proposal and accepted by the owner without or with modifications, if any and so incorporated in the award letter shall be deemed to be the essence of the contract. The contractor shall so organize his resources and perform his work as to complete it not later than the date agreed to.
- 6.2 The date of commencement shall be reckoned from the expiry of 30 days from the issue of letter of acceptance and submission of Performance Security or seven days after handing over the site for the first activity as per PERT network chart, whichever is later. The PERT/BAR chart both for works as well as supply is to be mutually agreed and finalized within 30 days of issue of LOA. The site may be handed over in full or part. The contractor shall give notice 30 days in advance prior to the completion of first activity for handing over the site required for Subsequent activity and this shall be provided as per the Critical/PERT network programme.
- 6.3 The contractor shall submit a detailed PERT network within the time frame agreed above consisting of adequate number of activities covering various key phases of the works such as design, procurement, manufacturing, shipment and field erection activities within fifteen (15) days after the date of acceptance of tender. This network shall also indicate the interface facilities to be provided by the owner and the dates by which such facilities are needed. Contractor shall discuss the network so submitted with the owner and the agreed network which may be in the form as submitted or in revised form in line with the outcome of discussions and shall form part of the contract to be signed within sixty (60) days from the date of letter of acceptance of notice of award of contract. During the performance of contract, if in the opinion of the engineer proper progress is not maintained suitable changes shall be made in the contractor's operations to ensure proper progress.

6.4 The above PERT network shall be reviewed and periodic review reports shall be submitted by the contractor as directed by the engineer.

6.5 Subsequent to the award of the contract, the contractor shall make available to the engineer, a detailed manufacturing programme, in line with the agreed contract network. Such manufacturing programme shall be reviewed, updated and submitted to the Engineer, once every two month thereafter.

6.6 If the contractor, without reasonable cause or valid reason, commits default in commencing the execution of the work within the aforesaid date, the company shall, without prejudice to any other right or remedy, be at liberty, by giving 15 days' notice in writing to the contractor to commence the work, failing which to forfeit the Performance Security Deposit and Additional Performance Security Deposit, if any, deposited by him.

Additionally, the company shall debar such defaulting contractor from participating in future tenders in concerned Subsidiary/CIL HQ for a period of minimum 1 (one) year from the date of issue of such letter. In case of JV/Partnership firm, the debarment shall also be applicable to all individual partners of JV/Partnership firm.

7.0 CONTRACT PRICE

7.1 The lump sum prices quoted by the contractor in his bid with additions and deletions as may be agreed before signing of the contract, for the entire scope of the work including furnishing and erection of equipment covered under the specifications and documents and shall be treated as the contract price.

8.0 CHANGED QUANTITY

8.1 The owner reserves the right to vary the quantities of items or groups of items to be ordered as specified in the accompanying technical specifications, as may be necessary, during the execution of the contract, but such variations unless otherwise specified in the accompanying technical specifications shall be limited to plus or minus twenty percent (20%) of the original quantity ordered.

9.0 DEDUCTIONS FROM CONTRACT PRICE

9.1 All costs, damages or expenses which the owner may have paid, for which under the contract the contractor is liable, will be claimed by the owner. All such claims shall be billed by the owner to the contractor regularly as and when they fall due. Such bills shall be supported by appropriate and certified vouchers or explanations, to enable the contractor to properly identify such claims. Such claims shall be paid by the contractor within fifteen (15) days of the receipt of the corresponding bills and if not paid by the contractor within the said period, the owner may then deduct the amount, from any moneys due or becoming due by him to the contractor under the contract or may be recovered by actions of law or otherwise, if the contractor fails to satisfy the owner of such claims.

10.0 CONTRACT PRICE ADJUSTMENT

- 10.1 All adjustments in the contract price shall be computed in accordance with the conditions and formulae prescribed in the relevant clauses of 'Additional Terms and Conditions of Contract', the accompanying technical specifications and further satisfying the requirements specified herein.
- 10.2 The contract price stated in the contract agreement is the base price. A certain fixed percentage of the base price as indicated in the technical specifications shall not be subject to any price adjustment. The balance percentage viz. the cost portion shall only be subject to price adjustment.
- 10.3 Price adjustment shall be applicable to the cost portion, only if changes in the cost of labour and materials (either increases or decreases) occur during the contract period, directly affecting the cost portion.
- 10.4 Variations in the cost of materials shall be determined by comparing published material indices as on the last date of submission of bid (inclusive of price part) or the revised price bid, whichever is later, with the same indices published during the manufacture at the respective cut off periods for material as specified in clause 2.0 of Additional Terms and Conditions of Contract. Variations in the cost of labour shall be determined by comparing the wages as per the Minimum Wages Act of Central or state govt. (whichever is higher) or HPC wages of CIL as applicable and mentioned in NIT as on the last date of submission of bid (inclusive of price part) or the revised price bid, whichever is later, with the same wages as per the Minimum Wages Act of Central or state govt. (whichever is higher) or HPC wages of CIL as applicable and mentioned in NIT, during the work/manufacture applicable to the place of work/manufacture at the respective cut off periods for labour as specified in clause 2.0 of Additional Terms and Conditions of Contract of this Volume
- 10.5 The total computed variation in the contract price shall be restricted to a limiting percentage as specified in clause 2.5 of Additional Terms and Conditions of Contract of this volume.
- 10.6 The price adjustment for the erection shall be made on the value of erection work done as indicated in each billing.
- 10.7 Every three months after the award of contract, and a month prior to shipment of equipment (in the case of ex-factory price component of contract price), and every month after establishing his site office (in the case of erection) the contractor shall submit to the engineer a written notice of the changes, if any, that have occurred in the specified material and labour indices during the previous reporting period containing the effective date of such change, the amount of change, the amount of contract price adjustment and documentary evidence to substantiate the price adjustment.
- 10.8 The contract price adjustment provisions detailed above, shall only be applicable if so specified in the Additional Terms and Conditions of Contract.

11.0 PACKING, FORWARDING AND SHIPMENT

- 11.1 The contractor, wherever applicable, shall after proper painting, pack and crate all equipment in such a manner as to protect them from deterioration and damage during rail and road transportation to the site and storage at the site till the time of erection. The contractor shall be held responsible for all damages due to improper packing.
- 11.2 The contractor shall notify the owner of the date of each shipment from his works, and the expected date of arrival at the site for the information of the owner.
- 11.3 The contractor shall also give all shipping information concerning the weight, size and content of each packing including any other information the owner may require.
- 11.4 The following documents shall be sent by registered post to the owner within 3 days from the date of shipment, to enable the owner to make progressive payments to the contractor: the payment shall be made only after receipt and acceptance of material at site in good condition.
Application for payment in the standard format of the owner (3 copies),
Invoice (6 copies),
Packing list (6 copies),
Pre-dispatch clearance certificate, if any (3 copies),
Test certificate, wherever applicable (3 copies),
- 11.5 The contractor shall prepare detailed packing list of all packages and containers, bundles and loose material forming each and every consignment dispatched to site. The contractor shall further be responsible for making all necessary arrangements for loading, unloading and other handling right from his works up to the site and also till the equipment is erected, tested and commissioned. He shall be solely responsible for proper storage and safe custody of all equipment.

12.0 DEMURRAGE, WHARFAGE, ETC.

- 12.1 All demurrage, wharfage and other expenses incurred due to delayed clearance of the material or any other reason shall be to the account of the contractor.

13.0 INSURANCE

- 13.1 The contractor shall arrange, secure and maintain insurance as may be necessary and for all such amounts to protect his interests and the interests of the owner, against all risks as detailed herein in the joint names of the Owner and the Contractor with the condition that payments against all claims shall be payable by insurers to the owner as elaborated at clause 13.5. All premiums and other charges of the said insurance policies shall be paid by the contractor. The form and the limit of such insurance, as defined herein together with the under-writer thereof in each case shall be acceptable to the owner. However, irrespective of such acceptance, the responsibility to maintain adequate insurance coverage on comprehensive all risks basis at all time during the period of contract shall be that of the contractor alone. The contractor's failure in this regard shall not relieve him of any of his contractual responsibilities and obligations.

- 13.2 Any loss of damage to the equipment, during handling, transporting, storage and erection, till such time the plant is taken over by the owner, shall be to the account of the contractor. The contractor shall be responsible for preferring of all claims and make good for the damage or loss by way of repairs and/or replacement of the portion of the works damaged or lost. The transfer of title shall not in any way relieve the contractor of the above responsibilities during the period of the contract. The contractor shall provide the owner with a copy of all insurance policies and documents taken out by him in pursuance of the contract. Such copies of document shall be submitted to the owner immediately after such insurance coverage. The contractor shall also inform the owner in writing at least sixty (60) days in advance, regarding the expiry, cancellation and/or change in any of such documents and ensure revalidation/renewal, etc. as may be necessary well in time.
- 13.3 The risks that are to be covered under the insurance shall include, but not be limited to, the loss or damage in transit, theft, pilferage, riot, civil commotion, weather conditions, accidents of all kinds, fire, etc. The scope of such insurance shall cover the entire value of the works from time to time.
- 13.4 All costs on account of insurance liabilities covered under the contract will be on contractor's account and will be included in contract price. However, the owner may from time to time, during the pendency of the contract, ask the contractor in writing to limit the insurance coverage risks and in such a case, the parties to the contract will agree for a mutual settlement for reduction in contract price to the extent of reduced premium amounts.
- 13.5 All insurance claims, payable by the insurers, shall be paid to the Owner which shall be released to the contractor in installments as may be certified by the Engineer-in-charge for the purpose of rebuilding or replacement or repair of the works and/or goods destroyed or damaged for which payment was received from the insurers.
- 13.6 The clause entitled insurance under the section erection terms and conditions of contract of this volume, covers the additional insurance requirements for the portion of the works to be performed at the site of work.

14.0 LIABILITY FOR ACCIDENTS AND DAMAGES

- 14.1 Under the contract, the contractor shall be responsible for loss or damage to the plant until the plant is taken over in accordance with clause entitled 'Taking Over' in section technical terms and conditions of contract of this volume.

15.0 LIQUIDATED DAMAGES FOR DELAY IN COMPLETION

- 15.1 If the contractor fails to maintain the required progress in terms of the agreed time and progress chart or to complete the work and clear the site on or before the date of completion of contract or extended date of completion, he shall without prejudice to any other right or remedy available under the law to the company on account of such breach, pay as compensation/ Liquidated Damages @ half percent (1/2%) of the contract price per week of delay. The aggregate of such compensation/ compensations shall not exceed 10 (ten) percent of the total

value as shown in the contract. This will also apply to items or group of items for which separate period of completion has been specified. The amount of compensation may be adjusted or setoff against any sum payable to the contractor under this or any other contract with the company.

15.1.1 The company, if satisfied, that the works can be completed by the contractor within a reasonable time after the specified time of completion, may allow further extension of time at its discretion with or without the levy of L.D. In the event of extension granted being with L.D, the company will be entitled without prejudice to any other right or remedy available in that behalf, to recover from the contractor as agreed damages equivalent to half percent of the contract value of the works for each week or part of the week subject to a ceiling of 10% of the contract price.

15.1.2 The company, if not satisfied that the works can be completed by the contractor, and in the event of failure on the part of the contractor to complete work within further extension of time allowed as aforesaid, shall be entitled, without prejudice to any other right, or remedy available in that behalf, to rescind the contract.

15.1.3 The company, if not satisfied with the progress of the contract and in the event of failure of the contractor to recoup the delays in the mutually agreed time frame, shall be entitled to terminate the contract.

15.1.4 In the event of such termination of the contract as described in clauses 15.1.2 or 15.1.3 or both, the company, shall be entitled to recover L.D. upto ten percent (10%) of the contract value besides recovery of compensation for damage/loss for termination as provided in 20.6 of General Terms and Conditions of Contract.

15.2 The company may waive the payment of compensation, depending upon merit of the case, on request received from the contractor if the entire work is completed within the date as specified in the contract or as validly extended without stipulating any penalty.

15.3 Liquidated damages for not meeting performance guarantee during the performance and guarantee tests shall be assessed and recovered from the contractor, as detailed in the General Technical Conditions. Such liquidated damages shall be without any limitation whatsoever and shall be in addition to damages, if any payable under any other clauses of conditions of contract.

16.0 CONTRACTOR'S DEFAULT

16.1 If the contractor shall neglect to execute the works with the diligence and expedition or shall refuse or neglect to comply with any reasonable orders given to him, in writing by the engineer in connection with the works or shall contravene the provisions of the contract, the owner may give notice in writing to the contractor to make good the failure, neglect or contravention complained of. Should the contractor fail to comply with the notice within thirty (30) days from the date of service thereof, then and in such case the owner shall be at liberty to employ other workmen and forthwith execute such part of the works as the

contractor may have neglected to do or if the owner shall think fit, it shall be lawful for him, without prejudice to any other right he may have under the contract, to take the works wholly or in part thereof and in that event the owner shall have free use of all contractor's equipment that may have been at the time on the site in connection with the works without being responsible to the contractor for fair wear and tear thereof and to the exclusion of any right of the contractor over the same, and the owner shall be entitled to retain and apply any balance which may otherwise be due on the contract by him to the contractor, or such part thereof as may be necessary, the payment of the cost of executing the said part of the works or of completing the works as the case may be. If the cost of completing the works or executing a part thereof as aforesaid shall exceed the balance due to the contractor, the contractor shall pay such excess. Such payment of excess amount shall be independent of the liquidated damages for delay which the contractor shall have to pay if the completion of works is delayed.

- 16.2 In addition, such action by the owner as aforesaid shall not relieve the contractor of his liability to pay liquidated damages for delay in completion of works as defined in clause 15.0 of this section.
- 16.3 The termination of the contract under this clause shall not entitle the contractor to reduce the value of the performance bank guarantee nor the time thereof. The performance guarantee shall be valid for the full value and for the full period of the contract including guarantee period.
- 16.4 The bidding documents will clearly state that, if the contractor fails to complete the work and the order is cancelled, the amount due to him on account of work executed by him, if payable, shall be paid to him only after due recoveries as per the provisions of the contract and that too after alternative arrangements to complete the work has been made.

17.0 FORCE MAJEURE

- 17.1 Force majeure is herein defined as any cause which is beyond the control of the contractor or the owner as the case may be which they could not foresee or with a reasonable amount of diligence could not have foreseen and which substantially affect the performance of the contract, such as:
- (a) natural phenomena, including but not limited to floods, draughts, earthquakes and epidemics:
 - (b) acts of any government, including but not limited to war, declared or undeclared, priorities, quarantines, embargoes, Provided either party shall within fifteen (15) days from the occurrence of such a cause notify the other in writing of such causes.
- 17.2 The bidding documents will clearly state that:
- (a) The successful bidder will advise, in the event of his having resort to this clause by a registered letter duly certified by the local chamber of commerce or statutory authorities, the beginning and end of the clause of delay, within fifteen days of the occurrence and cessation

of such Force Majeure condition. In the event of delay lasting over two months, if arising out of Force Majeure, the contract may be terminated at the discretion of the company.

(b) For delays arising out of Force Majeure, the bidder will not claim extension in completion date for a period exceeding the period of delay attributable to the causes of Force Majeure and neither company nor the bidder shall be liable to pay extra costs (like increase in rates, remobilization advance, idle charges for labour and machinery etc.), provided it is mutually established that the Force Majeure conditions did actually exist.

(c) If any of the Force Majeure conditions exists in the place of operation of the bidder even at the time of submission of bid he will categorically specify them in his bid and state whether they have been taken into consideration in their quotations.

17.3 The contractor or the owner shall not be liable for delays in performing his obligations resulting from any Force Majeure cause as referred to and/or defined above. The date of completion will, subject to hereinafter provided, be extended by a reasonable time even though such cause may occur after contractor's performance of his obligations has been delayed for other causes.

18.0 DELAYS BY OWNER OR HIS AUTHORISED AGENT

18.1 In case the contractor's performance is delayed due to any act of omission on the part of the owner or his authorized agents, then the contractor shall be given due extension of time for the completion of the works, to the extent such omission on the part of the owner has caused delay in the contractor's performance of his work. Regarding reasonableness or otherwise of the extension of time, the decision of the engineer shall be final.

19.0 EXTENSION OF DATE OF COMPLETION

19.1 On happening of any events causing delay as stated hereinafter, the contractor shall intimate immediately in writing the Engineer-in-Charge:

- a. due to any reasons defined as Force Majeure.
- b. non-availability of stores which are the responsibility of the owner to supply
- c. non-availability or breakdown of tools and plant to be made available or made available by the owner
- d. delay on the part of the contractors or tradesmen engaged by the owner not forming part of the contract, holding up further progress of the work
- e. non-availability of working drawings/work programme in time, which are to be made available by the company during progress of the work
- f. any other causes which, at the sole discretion of the company is beyond the control of the contractor.

19.2 A "Hindrances Register" shall be maintained by both the Company and the Contractor at site to record the various hindrances, as mentioned above, encountered during the course of execution.

- 19.3 The contractor may request the company in writing for extension of time within 14 days of happening of such event causing delay stating also, if practicable, the period for which extension is desired. The company may, considering the eligibility of the request, give a fair and reasonable extension of time for completion of the work. Such extension shall be communicated to the contractor in writing by the company through the Engineer-in-charge within 1 month of the date of receipt of such request. The contractor shall however use his best efforts to prevent or make good the delay by putting his endeavors constantly as may be reasonably required of him to the satisfaction of the Engineer-in-charge.
- 19.4 Provisional extension of time may also be granted by the Engineer -In-charge during the course of execution, on written request for extension of time within 15 (fifteen) days of happening of such events as stated above, reserving the company's right to impose/ waive liquidated damages at the time of granting final extension of time as per contract agreement.
- 19.5 When the period fixed for the completion of the contract is about to expire, the question of extension of the contract may be considered at the instance of the Contractor or the Company or the both. The extension will have to be by party's agreement, expressed or implied.
- 19.6 In case the Contractor does not apply for grant of extension of time within 15 (fifteen) days of hindrance occurring in execution of the work and the Company wants to continue with the work beyond the stipulated date of completion for reason of the work having been hindered, the Engineer-in-charge at his sole discretion can grant provisional extension of time even in the absence of application from the Contractor. Such extension of time granted by the Engineer-in-charge is valid provided the Contractor accepts the same either expressly or implied by his actions before and subsequent to the date of completion. Such extension of time shall be without prejudice to Company's right to levy compensation under the relevant clause of contract.

20.0 TERMINATION, SUSPENSION, CANCELLATION & FORECLOSURE OF CONTRACT

- 20.1 The owner shall, in addition to other remedial steps to be taken as provided in the conditions of contract, be entitled to cancel/terminate the contract in full or in part, if the contractor
- a. makes default in proceeding with the works with due diligence and continues to do so even after a notice in writing from the Engineer-in-charge, then on the expiry of the period as specified in the notice
- Or**
- b. commits default/breach in complying with any of the terms and conditions of the contract and does not remedy it or fails to take effective steps for the remedy to the satisfaction of the Engineer-in-charge, then on the expiry of the period as may be specified by the Engineer-in-charge in a notice in writing

Or

c. fails to complete the work or items of work with individual dates of completion, on or before the date/dates of completion or as extended by the company, then on the expiry of the period as may be specified by the Engineer-in-charge in a notice in writing

Or

d. shall offer or give or agree to give any person in the service of the company or to any other person on his behalf any gift or consideration of any kind as an inducement or reward for act/acts of favour in relation to the obtaining or execution of this or any other contract for the company.

Or

e. shall try to obtain a contract with the company by way of ring tendering or other non-bonafide method of competitive tendering.

Or

f. transfers, sublets, assigns the entire work or any portion thereof without the prior approval in writing from the Engineer-in-charge. The Engineer-in-charge may, by giving a written notice, cancel/terminate the whole contract or portion of it in default.

20.2 The owner shall in such an event give fifteen (15) days' notice in writing to the contractor of his decision to do so.

20.3 The contractor upon receipt of such notice shall discontinue the work on the date and to the extent specified in the notice, make all reasonable efforts to obtain cancellation of all orders and contracts to the extent they are related to the work terminated and terms satisfactory to the owner, stop all further sub-contracting or purchasing activity related to the work terminated, and assist the owner in maintenance, protection, and disposition of the works acquired under the contract by the owner.

20.4 The contract shall stand terminated under the following circumstances unless the owner is satisfied that the legal representatives of the individual contractor or of the proprietor of the proprietary concern and in the case of partnership the surviving partners, are capable of carrying out and completing the contract and the owner shall in any way not be liable to payment of any compensation to the estate of deceased contractor and/or to the surviving partners of the contractor's firm on account of the termination of the contract.:

a. If the contractor being an individual in the case of proprietary concern or in the case of a partnership firm any of its partners is declared insolvent under the provisions of insolvency act for the time being in force, or makes any conveyance or assignment of his effects or composition or arrangement for the benefit of his creditors amounting to proceedings for liquidation or composition under any insolvency act.

b. In the case of the contractor being a company, its affairs are under liquidation either by a resolution passed by the company or by an order of court, not being a voluntary liquidation proceedings for the purpose of amalgamation or reorganization, or a

receiver or manager is appointed by the court on the application by the debenture holders of the company, if any.

- c. If the contractor shall suffer an execution being levied on his/their goods, estates and allow it to be continued for a period of 21 days.
- d. On the death of the contractor being a proprietary concern or of any of the partners in the case of a partnership concern and the company is not satisfied that the legal representative of the deceased proprietor or the other surviving partners of the partnership concern are capable of carrying out and completing the contract. The decision of the company in this respect shall be final and binding which is to be intimated in writing to the legal representative or to the partnership concern.

20.5 If the contractor is an individual or a proprietary concern and the individual or the proprietor dies and if the contractor is a partnership concern and one of the partners dies, then unless the owner is satisfied that the legal representatives of the individual contractor or of the proprietor of the proprietary concern and in the case of partnership the surviving partners, are capable of carrying out and completing the contract the owner shall be entitled to cancel the contract as to its incomplete part without being in any way liable to payment of any compensation to the estate of deceased contractor and/or to the surviving partners of the contractor's firm on account of the cancellation of the contract.

The decision of the owner that the legal representatives of the deceased contractor or surviving partners of the contractor's firm cannot carry out and complete the contract shall be final and binding on the parties. In the event of such cancellation the owner shall not hold the estate of the deceased contractor and/or the surviving partners of the estate of the deceased contractor and/or the surviving partners of the contractor's firm liable to damages for not completing the contract.

20.6 On cancellation of the contract or on termination of the contract, the Engineer-in-charge shall have powers :

- a. To take possession of the site and any materials, constructional plant, implements, stores, etc. thereon.
- b. In such an event, the contractor shall be liable for loss/damage suffered by the employer because of action under this clause and to compensate for this loss or damage, the employer shall be entitled to recover higher of the following:
 - i) Forfeiture of security deposit comprising of performance guarantee and retention money and additional performance security, if any, at the disposal of the employer.

Or

- ii) 20% of value of incomplete work (Contract Value minus already executed value of the work).

The amount to be recovered from the contractor as determined above, shall, without prejudice to any other right or remedy available to the employer as per law or as per

agreement, will be recovered from any money due to the contractor on any account or under any other contract and in the event of any shortfall, the contractor shall be liable to pay the same within 30 days.

In case of failure to pay the same the amount shall be debt payable. In the event of above course being adopted by the Engineer-in-charge, the contractor shall have no claim to compensation for any loss sustained by him by reasons of his having purchased materials, equipment or entered into agreement or made advances on any account or with a view to the execution of work or performance of the contract. And in case action is taken under any of provision aforesaid, the contractor shall not be entitled to recover or to be paid any sum for any work thereof or actually performed under this contract unless and until the engineer-in-charge has certified in writing the performance of such work and value payable in respect thereof and he shall only be entitled to be paid the value so certified.

The need for determination of the amount of recovery of any extra cost/expenditure or of any loss/damage suffered by the company shall not however arise in the case of termination of the contract for death/demise of the contractor.

- 20.7 Suspension of work - The company shall have power to suspend the progress of the work or any part thereof and the Engineer-in-charge may direct the contractor in writing to suspend the work, for such period and in such manner as may be specified therein, on account of any default on the part of the contractor, or for proper execution of the work for reasons other than any default on the part of the contractor, or on ground of safety of the work or part thereof. In the event of suspension for reason other than any default on the part of the contractor, extension of time shall be allowed by the company equal to the period of such suspension. Any necessary and demonstrable costs incurred by the contractor as a result of such suspension of the works will be paid by the owner, provided such costs are substantiated to the satisfaction of the engineer. The owner shall not be responsible for any liabilities if suspension or delay is due to some default on the part of the contractor or his sub-contractor. The work shall, throughout the stipulated period of contract, be carried out with all due diligence on the part of the contractor. In the event of termination or suspension of the contract, on account of default on the part of the contractor, as narrated herein before, the security deposit and other dues of his work or any other work done under this company shall be forfeited and brought under the absolute disposal of the company provided, that the amount so forfeited shall not exceed 10% of the contract value.
- 20.8 Foreclosure of contract in full or in part - If at any time after acceptance of the tender, the company decides to abandon or reduce the scope of the work for any reason whatsoever the company, through its Engineer-in-charge, shall give notice in writing to that effect to the contractor. In the event of abandonment/reduction in the scope of work, the company shall be liable

- a. to pay the contractor at the contract rates full amount for works executed and measured at site up to the date of such abandonment/reduction in the work.
- b. to pay reasonable amount assessed and certified by the Engineer-in-charge of the expenditure incurred, if any, by the contractor on preliminary works at site. e.g. temporary access roads, temporary construction for labour and staff quarters, office accommodation, storage of materials, water storage tanks and supply for the work including supply to labour/staff quarters, office, etc.
- c. to pay for the materials brought to site or to be delivered at site, which the contractor is legally liable to pay, for the purpose of consumption in works carried out or were to be carried out but for the foreclosure, including the cost of purchase and transportation and cost of delivery of such materials. The materials to be taken over by the company should be in good condition and the company may allow at its discretion the contractor to retain the materials in full or part if so desired by him and to be transported by the contractor from site to his place.
- d. to take back the materials issued by the company but remaining unused, if any, in the work on the date of abandonment/reduction in the work, at the original issued price less allowance for any deterioration or damage caused while in custody of the contractor
- e. to pay for the transportation of tools and plants of the contractor from site to contractor's place or to any other destination, whichever is less.

The contractor shall, if required by the Engineer-in-charge, furnish to him books of accounts, papers, relevant documents as may be necessary to enable the Engineer-in-charge to assess the amount payable in terms of part 20.8(b), (c) and (e) above, the contractor shall not have any claim for compensation whatsoever either for abandonment or for reduction in the scope of work, other than those as specified above.

21.0 NO WAIVER OF RIGHTS

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

22.0 CERTIFICATE NOT TO AFFECT RIGHT OF OWNER AND LIABILITY OF CONTRACTOR

No interim payment certificate of the engineer, nor any sum paid on account, by the owner, nor any extension of time for execution of the works granted by the engineer shall affect or prejudice the rights of the owner against the contractor or relieve the contractor of his obligations for the due performance of the contract, or be interpreted as approval of the works

done or of the equipment furnished and no certificate shall create liability for the owner to pay for alterations, amendments, variations or additional works not ordered, in writing, by the engineer or discharge the liability of the contractor for the payment of damages whether due, ascertained, or certified or not, or any sum against the payment of which he is bound to indemnify the owner, nor shall any such certificate nor the acceptance by him of any sum paid on account or otherwise affect or prejudice the rights of the contractor against the owner.

23.0 GRAFTS AND COMMISSIONS ETC.

Any graft, commission, gift or advantage given, promised or offered by or on behalf of the contractor or his partner, agent, officers, director, employee or servant or any one of his or their behalf in relation to the obtaining or to the execution of this or any other contract with the owner, shall, in addition to any criminal liability which it may incur, subject the contractor to the cancellation of this and all other contracts and also to payment of any loss or damage to the owner resulting from any cancellation. The owner shall then be entitled to deduct the amount so payable from any moneys otherwise due to the contractor under the contract.

24.0 LANGUAGE AND MEASURES

All documents pertaining to the contract including specifications, schedules notices, correspondence, operating and maintenance instructions, drawings or any other writing shall be written in English language. The metric system of measurement shall be used exclusively in the contract.

25.0 RELEASE OF INFORMATION

The contractor shall not communicate or use in advertising, publicity, sales releases or in any other medium photographs or other reproduction of the works under this contract, or descriptions of the site, dimensions, quantity, quality or other information, concerning the works unless prior written permission has been obtained from the owner.

26.0 CONSTRUCTION OF THE CONTRACT

26.1 Deleted.

26.2 In case owner hands over his equipment to the contractor for executing, then the contractor shall at the time of taking delivery of the equipment/ dispatch documents be required to execute an indemnity bond in favour of the owner in the form acceptable to the owner for keeping the equipment in safe custody and to utilise the same exclusively for the purposes of the said contract.

26.3 The contract shall in all respects be construed and governed according to Indian Laws.

26.4 It is clearly understood that the total consideration for the contract(s) has been broken up into various components only for the convenience of payment of advance under the contract(s) and for the measurement of deviations or modifications under the contract(s).

27.0 COMPLETION OF CONTRACT

Unless otherwise terminated under the provisions of any other relevant clause, this contract shall be deemed to have been completed at the expiration of the guarantee period as provided for under the clause entitled 'Guarantee' in this section.

28.0 ENFORCEMENT OF TERMS

The failure of either party to enforce at any time of the provisions of this contract or any rights in respect thereto or to exercise any option herein provided, shall in no way be construed to be a waiver of such provisions, rights or options or in any way to affect the validity of the contract. The exercise by either party of any of its rights herein shall not preclude or prejudice either party from exercising the same or any other right it may have hereunder.

29.0 ENGINEER'S DECISION

29.1 In respect of all matters which are left to the decision of the engineer including the granting or with holding of the certificates, the engineer shall, if required to do so by the contractor give in writing a decision thereon.

29.2 If in the opinion of the contractor, a decision made by the engineer is not in accordance with the meaning and intent of the contract, the contractor may file with the engineer within fifteen (15) days after receipt of the decision, a written objection to the decision. Failure to file an objection within the allotted time will be considered as acceptance of the engineer's decision and the decision shall become final and binding.

29.3 The engineer's decision and the filing of the written objection thereto shall be a condition precedent to the right to any legal proceedings. It is the intent of the agreement that there shall be no delay in the execution of the works and the decision of the engineer as rendered shall be promptly observed.

30.0 CO-OPERATION WITH OTHER CONTRACTORS AND CONSULTING ENGINEERS

The contractor shall agree to co-operate with the owner's other contractors and consulting engineers and freely exchange with them such technical information as is necessary to obtain the most efficient and economical design and to avoid unnecessary duplication of efforts. The engineer shall be provided with three copies of all correspondence addressed by the contractor to other sub-contractors and consulting engineers in respect of such exchange of technical information,

31.0 TRAINING OF OWNER'S PERSONNEL

31.1 The contractor shall undertake to train free of cost, engineering personnel selected and sent by the owner at the works of the contractor unless otherwise specified in the technical specifications. The period and the nature of training for the individual personnel shall be agreed upon mutually between the contractor and the owner. These engineering personnel shall be given special training in the shops, where the equipment will be manufactured and/or

their collaborator's works and where possible, in any other plant where equipment manufactured by the contractor or his collaborator is under installation or test, to enable those personnel to become familiar with the equipment being furnished by the contractor.

31.2 All travelling and living expenses for the engineering personnel to be trained during the total period of training will be borne by the owner. These engineering personnel while undergoing training shall be responsible to the contractor for discipline.

31.3 In the event of the owner, for any reason, failing to avail of the training facilities, he shall not be entitled for any rebate whatsoever on this account.

32.0 POWER TO VARY OR OMIT WORK

32.1 No alterations, amendments, omissions, suspensions or variations of the works (hereinafter referred to as 'Variation') under the contract as detailed in the contract documents, shall be made by the contractor except as directed in writing by the engineer, but the engineer shall have full power subject to the provision hereinafter contained from time to time during the execution of the contract, by notice in writing, to instruct the contractor to make such variation without prejudice to the contract. The contractor shall carry out such variation and be bound by the same conditions as far as applicable as though the said variation occurred in the contract documents. If any suggested variation would, in the opinion of the contractor, if carried out, prevent him from fulfilling any of his obligations or guarantees under the contract, he shall notify the engineer there of in writing and the engineer shall decide forthwith, whether or not the same shall be carried out and if the engineer confirm his instructions, contractor's obligations and guarantees shall be modified to such an extent as may be mutually agreed. Any agreed difference in cost occasioned by any such variation shall be added to or deducted from the contract price as the case may be.

32.2 In the event of the engineer requiring any variation, such reasonable and proper notice shall be given to the contractor to enable him to work his arrangements accordingly, and in cases where goods or materials are already prepared or any design, drawings of pattern made or work done requires to be altered, a reasonable and agreed sum in respect there of shall be paid to the contractor.

32.3 In any case in which the contractor has received instructions from the engineer as to the requirement of carrying out the altered or additional substituted work which either then or later on, will in the opinion of the contractor, involve a claim for additional payments, the contractor shall immediately and in no case later than thirty (30) days, after receipt of the instructions aforesaid and before carrying out the instructions, advise the engineer to that effect. But the engineer shall not become liable for the payment of any charges in respect of any such variations, unless the instructions for the performance of the same shall be confirmed in writing by the engineer.

- 32.4 If any variation in the works results in reduction of contract price, the parties shall, agree, in writing, so to the extent of any change in the price, before in contractor proceeds with the change.
- 32.5 In all the above cases, in the event of a disagreement as to the reasonableness of the said sum, the decision of the engineer shall prevail.
- 32.6 Notwithstanding anything stated above in this clause, the engineer shall have the full power to instruct the contractor, in writing, during the execution of the contract, to vary to quantities of the items or groups of items. The contractor shall carry out such variations and be bound by the same conditions, as though the said variations occurred in the contract documents. However, the contract price shall be adjusted at the rates and the prices provided for the original quantities in the contract.

33.0 GUARANTEE/ DEFECT LIABILITY

33.1 The contractor shall warrant that the equipment will be new and in accordance with the contract documents and be free from defects in material, design, manufacture and workmanship for a period of sixty (60) calendar months commencing immediately upon the satisfactory completion of the Performance Guarantee (PG) Test.

The contractor's liability shall be limited to the replacement of any defective parts in the equipment of his own manufacture or those of his sub-contractor (s)/ sub-vendor (s) or replacement of the complete equipment, under normal use and arising solely from faulty design, manufacture, materials, and/or workmanship provided always that such defective parts/equipment are repairable at the site/ replacing the equipment as a whole without hampering the operation of the plant. Such replaced defective parts/ old equipment shall be returned to the contractor unless otherwise arranged. No repairs or replacements shall be carried out by the engineer in charge of the employer during the 60 calendar months, as the plant is under the supervision of the contractor's supervisory engineers/staff.

33.2 The operation of the plant will be done departmentally by the respective subsidiary companies or by the EPC contractor, as per provisions of tender document. However, **in both cases** the successful EPC contractor shall be responsible for maintaining the plant during 60 calendar months including repair, replacement of the spare parts, components, equipment etc. free of cost.

33.3 If the facilities or any part thereof cannot be used by reason of such defect and/or making good such defect, 60 calendar months (i.e. five years of Defect liability period (DLP) including maintenance of plant by contractor or five years of Operation & Maintenance of plant by contractor, as per the provisions of tender document) of any facilities or such part, as the case may be, shall be extended by a period equal to the period during which the facilities or such part cannot be used by the employer because of aforesaid reasons.

33.4 In case of failure of any equipment/system in during the initial period of 60 calendar months (i.e. five years of Defect liability period (DLP) including maintenance of plant by

contractor or five years of DLP including Operation & Maintenance of plant by contractor, as per the provision of tender document) the EPC contractor shall repair/replace the equipment/system etc. at his own cost. All the equipment should be guaranteed for a minimum of 90% availability of plant during defect liability period from the date of commissioning calculated on quarterly basis.

The following formula may be adopted to calculate percentage availability.

$$\frac{\text{TotalshiftHours} - \text{breakdownHours} - \text{maintenancHours}}{\text{TotalshiftHours}} \times 100$$

Total shift hours=8×No. of shifts operated in 3 or 12 months as elaborated (quarterly/annual basis)including those on scheduled holidays.

In the event that equipment fails to achieve the availability herein provided, measured over each quarter, contractor shall be liable for and pay to the employer, as penalty, a sum equal to as indicated hereunder to be adjusted against running bill/performance guarantee:

a.0.25% of contract price (excluding GST) for reduction in every percentage or part thereof from guaranteed availability of 90%, calculated on quarterly basis.

b.In case the availability falls below 80%, 10% of contract price (excluding GST) shall be deducted as penalty calculated on annual basis.

However, the total penalty on account of failure in guaranteed availability shall not exceed 10% of contract price (excluding GST). This will be in addition to Liquidated damages (LD) for delay in completion and failure in PG Test.

34.0 REPLACEMENT OF DEFECTIVE PARTS AND MATERIALS

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

34.2 The contractor's full and extreme liability under this clause shall be satisfied by the payments to the owner of the extra cost, of such replacement procured, including erection, as provided

for in the contract, such extra cost being the ascertained difference between the price paid by the owner for such replacements and the contract price portion for such defective plant and repayments of any sum paid by the owner to the contractor in respect of such defective plant. Should the owner not so replace the defective plant, the contractor's extreme liability under this clause shall be limited to repayment of all sums paid by the owner under the contract for such defective plant.

35.0 DEFENCE OF SUITS

If any action in court is brought against the owner or engineer or an officer or agent of the owner, for the failure or neglect on the part of the contractor to perform any acts, matters, covenants or things under the contract, or for damage or injury caused by the alleged omission or negligence on the part of the contractor, his agents, representatives or his sub-contractors, workmen, suppliers or employees, the contractor shall in all such cases indemnify and keep the owner, and the engineer and/or his representative, harmless from all losses, damages, expenses or decrees arising of such action.

36.0 LIMITATIONS OF LIABILITIES

The final payment by the owner in pursuance of the contract shall mean, the release of the contractor from all his liabilities under the contract. Such final payment shall be made only at the end of the guarantee period as detailed in clause 33 above and till such time as the contractual liabilities and responsibilities of the contractor, shall prevail. All other payments made under the contract shall be treated as on account payments.

37.0 MARGINAL NOTES

The marginal notes to any clause of the contract shall not affect or control the construction of such clause.

38.0 TAXES, PERMITS & LICENCES

The contractor shall be liable and pay all- Indian taxes, (other than Goods and Services tax and GST Compensation Cess, if applicable) duties, levies, royalties, whether local, municipal, provincial or central lawfully assessed against the owner or the contractor in pursuance of the contract. In addition, the contractor shall be responsible for payment of all Indian duties, levies and taxes lawfully assessed against the contractor for his personal income and property only. This clause shall be read in conjunction with clause 11.3 of Instruction to Bidders.

The contractor, along with his bills, shall submit proper documents in the name of the Company to enable the Company to claim Input Tax Credit under the applicable laws. The invoice shall be in compliance with the relevant rules.

CIL/Subsidiary is entitled to avail Input Tax Credit on account of: CGST, SGST/UTGST, IGST and GST Compensation Cess, as applicable for indigenous product/imported products. Hence set off allowed against CGST, SGST/UTGST, IGST and GST Compensation Cess as per relevant rules/act. Contractor shall submit relevant document as desired by

CIL/Subsidiary at the time of supply, along with the bills/invoice as per relevant rules for enabling subsidiary to claim Input tax credit benefit.

Clause No. 11.3 of Instructions to Bidders may also be referred.

39.0 PROGRESS REPORTS AND PHOTOGRAPHS

During the various stages of the works in the pursuance of the contract, the contractor shall at his own cost submit periodic progress reports as may be reasonably required by the engineer with such materials as charts, net-works, photographs, test certificates, etc. such progress report shall be in the form and size as may be required by the engineer and shall be submitted in at least three (3) copies.

40.0 LONG TERM AVAILABILITY OF SPARES

- 40.1 The contractor shall guarantee the long term availability of spares to the owner for the full life of the equipment covered under the contract. The contractor shall guarantee that before going out of production of spare parts of the equipment covered under the contract, he shall give the owner at least twelve (12) months advance notice so that the latter may order his bulk requirement of spares, if he so desires. The same provision will also be applicable to sub-contractor. Further, in case of discontinuance of manufacture of any spares by the contractor or his sub-contractors the contractor will provide the owner two years in advance, with full manufacturing drawings, material specifications and technical information required by the owner for the purpose of manufacture of such items.
- 40.2 Further, in case of discontinuance of supply of spares by the contractor or his sub-contractors the contractor will provide the owner with full information for replacement of such spares with other equivalent makes, if so required by the owner.
- 40.3 The contractor shall provide the owner with a "directory" of his sub-contractors giving the addresses and other particulars of his sub-contractors. The owner, if he so desires, shall have the right to procure the spares directly from sub-contractors.
- 40.4 Notwithstanding anything stated elsewhere in the bid documents, the prices of all spares which may be procured to cover long term requirements beyond the Sixty (60) calendar months, will be generally in accordance with the mutually agreed prices.
- 40.5 The contractor will indicate in advance the delivery period of the items of spares, which the owner may procure in accordance with the sub-clause 40.4. In case of emergency requirements of spares, the contractor would make every effort to expedite the manufacture and delivery of such spares on the basis of mutually agreed time schedule.
- 40.6 The procedure specified in clauses 40.4 and 40.5 shall apply for future procurement of items included in stand by spare list, mandatory spares lists, optional spares list and special tools, plants and equipment list, if any, specified in the bid documents.
- 40.7 The Contractor shall indemnify the owner for the availability of long time spares as per the terms and conditions laid down above in clause 40.1 to clause 40.6.

40.8 In case of equipment/ system (including manufactured domestic and overseas) the availability of spare parts for additional sixty (60) calendar months after sixty (60) calendar months (i.e. five years of Defect liability period (DLP) including maintenance of plant by contractor or five years of Operation & Maintenance of plant by contractor, as per the provisions of tender document) shall have to be guaranteed by the contractor. In this regard, the contractor will have to provide, an undertaking from the respective OEMs regarding supply of spare parts and maintenance support as and when required during the said period, before starting of Defect Liability Period.

41.0 PAYMENT

41.1 The payment to the contractor for the performance of the works under the contract will be made by the owner as per the guidelines and conditions specified herein. All payment made during the contract shall be on account payments only. The final payment will be made on completion of all the works and on fulfillment by the contractor of all his liabilities under the contract.

41.2 CURRENCY OF PAYMENT

All payments under the contract shall be in Indian Rupees only.

41.3 DUE DATES FOR PAYMENT

Owner will make progressive payment as and when the payment is due as per the terms of payment set forth in the accompanying technical specifications. Payment will become due and payable by the owner within thirty (30) days from the date of receipt of contractor's bill/invoice/debit note by the owner, provided the documents submitted are complete in all respects.

41.4 PAYMENT SCHEDULE

The contractor shall prepare and submit to the engineer for approval, a break-up of the contract price. This contract price break-up shall be interlinked with the agreed detailed PERT network of the contractor setting forth his starting and completion dates for the various key phases of works prepared as per condition of this section. While preparing the PERT network, the supply of P&M Equipment shall be linked to construction of respective Civil and Structural Works. Any payment under the contract shall be made only after the contractor's price break-up is approved by the engineer. The aggregate sum of the contractor's price break-up shall be equal to the lump sum contract price.

41.5 INTERIM PAYMENTS

41.5.1 The contractor shall submit running bill for the payment in the prescribed proforma of the owner to be supplied in due course at the time of payment.

41.5.2 Each such running bill shall state the amount claimed and shall set forth in detail, in the order of the payment schedule, particulars of the works including the works executed at site and of

the equipment shipped/brought on to the site pursuant to the contract up to the date mentioned in the bill and for the period covered since the last preceding certificate, if any.

41.5.3 Every interim payment claim shall indicate the contract value of the works executed up to the date mentioned in the running bill, provided that no sum shall be included in any running bill in respect of the works that, according to the decision of the engineer, does not comply with the contract, or has been performed, at the date of certificate prematurely.

41.6 TERMS OF PAYMENTS

41.6.1 Payment: Since the total job is on turn-key basis, any payment to the Contractor before the final payment shall be treated as provisional payment towards the total contract value.

The Contractor may at intervals of not less than one month submit claims/ bills for payment on account of work done after proper scrutiny and certification of the same by the Employer. The progressive payment shall be made in respect of the following:

- a) Design engineering
- b) Civil construction including foundation and buildings
- c) Structural fabrication and erection
- d) Supply of equipment
- e) Machinery Erection
- f) Trial Run and commissioning

All such payments shall be made by the Employer online/ through Account Payee Cheque within a month from the date of the submission of claims/bills. Payment will also be governed by Clauses of 3.0 of General Terms & Conditions of Contract. Any sum due from the Contractor shall be deducted from the first or next subsequent on account of payments as the case may be, in general the following procedure of payment shall be followed:

41.6.1.1 Design and Engineering.

- a) 90% payment on completion of approval of system, mechanical, electrical, civil, structural design, drawings etc. as per contract on pro-rata basis.
- b) 5% payment on Preliminary acceptance of the works after start-up and trial operation as per General Technical Conditions.
- c) 5% on issue of final acceptance certificate of the works after performance and guarantee test as per General Technical Conditions.

41.6.1.2 Civil/Structural Works:

- a) 95% payment on progress of work completed, duly measured and certified by the engineer.
- b) 5 % on issue of final acceptance certificate of the works after performance guarantee test as per General Technical Conditions.

41.6.1.3 Supply of Equipment:

- a) 90% payment on receipt of the equipment conforming to stipulated specifications and quality in good condition at site to be certified by the site engineer.

b) 5% on preliminary acceptance of the works after start-up and trial operation as per General Technical Conditions.

c) 5% on issue of final acceptance certificate of the works after performance and guarantee test as per General Technical Conditions.

Note: The supply of equipment should commensurate with mutually agreed BAR/PERT chart.

41.6.1.4 Installation & Commissioning:

a) 90% progress payment based on the installation and commissioning of plant and equipment duly certified by site engineer.

b) 5% payment on preliminary acceptance of the works after start-up and trial operation as per General Technical Conditions.

c) 5% on issue of final acceptance certificate of the works after performance and guarantee test as per General Technical Conditions.

41.6.1.5 Final Bill:

As soon as possible after completion of the works to the satisfaction of the Employer the Contractor shall forward a certified final bill. It shall be accompanied by all relevant vouchers, such as royalty clearance certificate (if any) from appropriate authorities, submission of copies of working drawings, technical documents as required documents showing therein all additions and alternations etc. in the process of execution, completion certificate for embedded and covered up works, plant handing over certificate etc. as applicable. The Contractor shall be paid full and final payment only after deduction of amounts paid against on account bill and any other amount due etc. payable by Contractor.

In cases where the Preliminary Acceptance Test (start-up & trial operation) and Final Acceptance Test (Performance Guarantee Test) is not completed for reasons not attributable to the contractor, the payment which is to be released after Preliminary Acceptance & Final Acceptance certificate will be released against equivalent amount of Bank Guarantee with validity up to actual completion (Initial BG validity should for 1(one) year and to be extended till actual completion of respective tests from time to time) of respective tests.

42.0 SETTLEMENT OF DISPUTES

It is incumbent upon the contractor to avoid litigation and disputes during the course of execution. However, if such disputes take place between the contractor and the department, effort shall be made first to settle the disputes at the company level.

The contractor should make request in writing to the Engineer-in-charge for settlement of such disputes/ claims within 30 (thirty) days of arising of the cause of dispute/ claim failing which no disputes/ claims of the contractor shall be entertained by the company.

Effort shall be made to resolve the dispute in two stages:

In first stage dispute shall be referred to Area CGM/GM. If difference still persist the dispute shall be referred to a committee constituted by the owner. The committee shall have one member of the rank of Director of the company who shall be chairman of the **committee**.

If differences still persist, the settlement of the dispute shall be resolved in the following manner:

Disputes relating to the commercial contracts with Central Public Sector Enterprises / Govt. Departments (except Railways, Income Tax, Customs & excise duties)/ State Public Sector Enterprises shall be referred by either party for Arbitration to the PMA (Permanent Machinery of Arbitration) in the department of Public Enterprises.

In case of parties other than Govt. Agencies, the redressal of the dispute may be sought through Arbitration (THE ARBITRATION AND CONCILIATION ACT, 1996 as amended by AMENDMENT ACT of 2015).

42A. Settlement of Disputes through Arbitration

If the parties fail to resolve the disputes/differences by in house mechanism, then, depending on the position of the case, either the employer/owner or the contractor shall give notice to other party to refer the matter to arbitration instead of directly approaching Court. The contractor shall, however, be entitled to invoke arbitration clause only after exhausting the remedy available under the clause 42.

In case of parties other than Govt. agencies, the redressal of disputes/differences shall be sought through Sole Arbitration as under.

Sole Arbitration:

In the event of any question, dispute or difference arising under these terms & conditions or any condition contained in this contract or interpretation of the terms of, or in connection with this Contract (except as to any matter the decision of which is specially provided for by these conditions), the same shall be referred to the sole arbitration of a person, appointed to be the arbitrator by the Competent Authority of CIL / CMD of Subsidiary Company (as the case may be). The award of the arbitrator shall be final and binding on the parties of this Contract.

(a) In the event of the Arbitrator dying, neglecting or refusing to act or resigning or being unable to act for any reason, or his/her award being set aside by the court for any reason, it shall be lawful for the Competent Authority of CIL / CMD of Subsidiary Company (as the case may be) to appoint another arbitrator in place of the outgoing arbitrator in the manner aforesaid.

(b) It is further a term of this contract that no person other than the person appointed by the Competent Authority of CIL / CMD of Subsidiary Company (as the case may be) as aforesaid should act as arbitrator and that, if for any reason that is not possible, the matter is not to be referred to Arbitration at all.

Subject as aforesaid, Arbitration and Conciliation Act, 1996 as amended by Amendment Act of 2015 and the rules thereunder and any statutory modification thereof for the time being in force shall be deemed to apply to the Arbitration proceedings under this clause.

The venue of arbitration shall be the place from which the contract is issued.

Applicable Law: The contracts shall be interpreted in accordance with the laws of the Union of India.

Contracts with Partnership firm/ Joint Venture:

The Partnership firm /Joint Venture is required to submit written consent of all the partners to above arbitration clause at the time of submission of bid.

43 SALES TAX ON WORKS CONTRACTS

The company reserves the right to deduct/ withhold any amount towards taxes, levies, etc. and to deal with such amount in terms of the provisions of the Statute or in terms of the direction of any Statutory authority and the company shall only provide with certificate towards such deduction and shall not be responsible for any reason whatsoever.

44 E-way Bill: The e-way bill required in connection with supply of goods or services, if any, shall be arranged by the supplier/vendor. However, the e-way bill will be arranged by CIL/Subsidiary if the supplier/vendor is unregistered one or if provisions of the relevant Act and the rules made there under specifically states that the e-way bill is required to be issued by recipient of goods.

45 In the event of recovery of any claim towards LD Charges, Penalty, fee, fine or any other charges from the supplier/vendor, the same will be recovered along with the applicable GST and the amount shall be adjusted with the payment to be made to the supplier/vendor against their bill/invoice or any other dues.

46 DEFAULT AND DELAY IN COMMENCING THE WORK

If the contractor, without reasonable cause or valid reason, commits default in commencing the execution of the work within the aforesaid date, the company shall without prejudice to any other right or remedy, be at liberty, by giving 15 days' notice in writing to the contractor to commence the work, failing which to forfeit the Earnest Money Deposited by him.

Additionally, the Company will reserve the right to debar such defaulting Contractors from participating in future Tenders for a minimum period of one year.

47 The contractor shall directly pay the ex- gratia amount of ₹ 15.00 lakhs to the same dependent family member to the deceased contractor's worker, who died in mine accident as certified by DGMS, to whom the statutory benefits under Employee compensation Act, Provident Fund Act etc. have been paid, as per the terms of Contract or through Insurance company by availing Group Personal Accident Insurance Policy for all its workers before commencement of the contract, which shall be renewed periodically to cover the entire duration of the contract. No reimbursement shall be made on this account by CIL/ subsidiaries.

In order to comply with the above provisions, contractor shall immediately on receipt of letter of acceptance/ work order shall obtain group personal accident insurance in respect of all the workmen engaged in mining activities for payment of ₹ 15.0 Lakhs in case of death in mine accident. A proof to such effect shall be produced to the satisfaction of the management before commencement of the work. However, the responsibility of payment of special relief/ ex- gratia amount shall lie exclusively with the contractor.

If the contractor fails to disburse the special Relief/ Ex-gratia within the due date, the

subsidiary concerned may make the payment to the eligible dependent as mentioned herein above. However, such amount shall be recovered from the Contractor from his dues either in the same and/or other subsidiaries/CIL.

48 Guidelines for Banning of Business

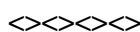
Guidelines for effecting 'Banning of Business' with the contracting entity:

1. Observance of Principle of Natural Justice before banning the business dealings with any contracting entity.
 2. The contracting entity may be banned in the following circumstances :-
 - i) If bidder backs out after notification of opening of price bid and if that bidder is found to be L-1.
 - ii) If L-1 bidder fails to submit Performance Security Deposit and Additional Performance Security Deposit, if any and/or fails to execute the contract within stipulated period.
 - iii) If L-1 bidder fails to start the work on scheduled time.
 - iv) In case of failure to execute the work as per mutually agreed work schedule.
 - v) Continued and repeated failure to meet contractual Obligations:
 - a. In case of partial failure on performance, agency shall be banned from future participation in tenders keeping his present contract alive.
 - b. On termination of contract.
 - vi) Willful suppression of facts or furnishing or wrong information or manipulated or forged documents by the Agency or using any other illegal/unfair means.
 - vii) Formation of price cartels with other contractors with a view to artificially hiking the price.
 - viii) The contractor fails to maintain/repair/redo the work up to the expiry of performance guarantee period, when it is specifically brought to his notice.
 - ix) Contractor fails to use Mobilization advance given to him for the purpose it was intended.
 - x) Contractor fails to renew the securities deposited to the department.
 - xi) The contractor fails to rectify any lapse(s) in quality of the work done within defectliability period.
 - xii) Transgression of any clause(s) relating to Contractor's obligation defined in the Integrity Pact wherever such Pact exists.
 - xiii) Any other breach of Contract or misdeed which may cause financial loss or commercial disadvantage to the Company.
3. Such 'Banning of Business', if and when effected, shall be with prospective effect only. The effect of 'Banning of Business' shall be for future tenders from the date of issue of such Order. However, if any contracting entity is banned after online notification of opening of Price Bid, such a ban will not be effective for that work.

4. The banning shall be for a minimum period of one year and shall be effective for the concerned Subsidiary for the tenders invited at Subsidiary level. Similarly, in case of tenders of CIL HQ, banning shall be for CIL HQ. However, if such 'Banning of Business' has to be made effective for entire CIL and its Subsidiaries then approval of Chairman, CIL shall be required.
5. Once a contracting entity is banned, it shall be extended to the constituents of that entity, all partners in case of Joint Venture, all the partners in case of Partnership Firm, owner/proprietor in case of Proprietorship Firm and all the Directors in case of Limited Company. If such banned owner/Proprietor/Partner/Director make/form different Firms/entity and attempts to participate in tenders, the same will not be entertained during the currency of such banning.
6. The above 'Banning of Business' shall be in addition to other penal provisions of NIT/Contract document.
7. **Approving Authority:** The 'Banning of Business' of a contracting entity shall be done with the approval of the Competent Authority as per the details below:
 - a) In case the Accepting Authority of the work is Board or Empowered Committee or FDs or CMD of CIL/Subsidiary Company, then the Competent Authority for banning shall be CMD of CIL/Subsidiary Company.
 - b) In case the Accepting Authority of the work is upto the level of Director of CIL/Subsidiary Company, then the Competent Authority for banning shall be Director of CIL/Subsidiary Company.
8. Appellate Authority shall be one Rank higher than the Competent Authority meant for 'Banning of Business'. In case the banning is done with the approval of CMD of the Subsidiary Company then Chairman, CIL shall be the Appellate authority.
9. Any change on the above may be done with approval of FDs of CIL.
10. All the orders of banning or orders passed in appeal shall be marked to GM(CMC) / Civil / concerned HODs of CIL/Subsidiary Company. Further, all such orders will be uploaded in Coal India site as well website of the Subsidiary Company.

49. Discrepancies in contract documents & Adjustments thereof

- 49.1** In the event of varying or conflicting provision in any of the document(s) forming part of the contract, the Accepting Authority's decision/clarification shall hold good with regard to the intention of the document or contract as the case may be
- 49.2** Any error in description, quantity or rate in Bill of Quantities or any omission there from, shall not vitiate the contract or release the contractor from discharging his obligations under the contract including execution of work according to the Drawings and Specifications forming part of the particular contract document.



SUB-SECTION -3.2
ADDITIONAL TERMS AND CONDITIONS
OF
CONTRACT

SUB-SECTION – 3.2

ADDITIONAL TERMS & CONDITIONS OF CONTRACT

The following additional terms & conditions are also acceptable to the company. The tenderers are requested not to quote any additional conditions in their tender.

1. MOBILISATION ADVANCE :

No Mobilization advance will be given.

2.0 PRICE VARIATION CLAUSE:

2.1 The contract price shall remain firm without any price variation due to escalation for the portions of survey, geo-engineering investigations, design and engineering and supply of equipments, plant and machineries as envisaged in the scope of work and the price agreed thereon as per the contract except the statutory increase/decrease in taxes and duties.

2.1.1 If the contract is to be extended beyond the stipulated period for completion of the work due to fault on the part of the contractor escalation on prices should not be allowed further if not provided otherwise in the accepted contract.

2.2 For the portions of civil and structural works and erection and commissioning works of the plant & machineries, the price variation due to escalation shall be allowed to the extent as detailed hereinafter

2.2.1 If the prices of materials (not being materials supplied at fixed issue rates by the company) and wages of labour, required for execution of the work, increase, the contractor shall be compensated for such increase as per provisions detailed below:

- a) The amount of the contract shall accordingly be varied, subject to the condition that such compensation for variation in prices shall be available only for the work done during the stipulated period of the contract as per the work programme agreed including such period for which the contract is validly extended under the provisions of the contract without any penal action.
- b) The base date for working out such price variation shall be as on the last date of submission of bid (inclusive of price part) or the revised price bid (inclusive of revised offer if any), whichever is later.
- c) The compensation of Price variation shall be worked out at quarterly intervals and shall be with respect to the cost of work done during the previous three months. The first such payment shall be made at the end of three months after the month (Excluding) in which the tender was accepted and thereafter at three months' interval.

2.2.1.1 PRICE VARIATION FOR LABOUR:

The amount paid to the contractor for the work done shall be adjusted for increase or decrease in the cost of labour and the cost shall be calculated quarterly in accordance with the following formula:

$$V_L = \frac{W \times A}{100} \times \frac{L - L_0}{L_0}$$

Where:

V_L = Variation in labour cost i.e. increase or decrease in the amount in rupees to be paid or recovered.

W = Value of work done during the period under reckoning to which the price variation relates as indicated in clause no. 2.3 of the 'ADDITIONAL TERMS & CONDITIONS OF CONTRACT'.

A = Component of labour expressed as percentage of the total value of work adopted from Table-1

L_0 = Minimum wages for unskilled workers payable as per the Minimum Wages Act of Central or state govt. (whichever is higher) or HPC wages of CIL as applicable and mentioned in NIT, applicable to the place of work as on the last date stipulated for receipt of the Price bids or Revised Price bids whichever is later.

L = Revised minimum wages of unskilled workers corresponding to L_0 during the period to which the escalation relates.

2.2.1.2 Price Variation on Materials:

The amount to be paid to the contractor for the work done shall be adjusted for increase or decrease in the cost of materials and the cost shall be calculated quarterly in accordance with the following formula:

$$V_m = W \times \frac{B}{100} \times \frac{M - M_0}{M_0}$$

Where:

V_m = Variation in material cost i.e. increase or decrease in the amount in rupees to be paid or recovered.

W = Value of work done during the period under reckoning to which the price variation relates as indicated in Clause no. 2.3 of the "ADDITIONAL TERMS & CONDITIONS OF CONTRACT".

B = Component of material expressed as percentage of the total value of work adopted from **Table-1** below.

M = Average All India Wholesale Price Index for all commodities for the period to which price variation relates as published by the RBI Bulletin, Ministry of Industry & Commerce, Govt. Of India.

M_0 = All India Wholesale Price Index for all commodities as published by the RBI Bulletin, Ministry of Industry & Commerce, Govt. Of India, relating to the last date of submission of bid (inclusive of price part) or the revised price bid (inclusive of revised offer if any), whichever is later.

2.2.1.3 PRICE VARIATION ON POL:

The amount to be paid to the contractor for the work done shall be adjusted for increase or decrease in the cost of POL and the cost shall be calculated quarterly in accordance with the following formula:

$$V_f = W \times \frac{C}{100} \times \frac{F - F_0}{F_0}$$

Where:

- V_f = Variation in the cost of fuel , oil & lubricants increase or decrease in the amount in rupees to be paid or recovered.
- W = Value of work done during the period under reckoning to which the price variation relates as indicated in Clause no. 2.3 of the “ADDITIONAL TERMS & CONDITIONS OF CONTRACT”.
- C = Component of POL expressed as percentage of the total value of work adopted from **Table-1** below.
- F = Average Index Number for Wholesale Price for the group of fuel , power, light and lubricants as published by Economic Advisor , Ministry of Industry , Govt. Of India for the period to which price variation relates.
- F_0 = Index Number for Wholesale Price for the group of "fuel , power, light and lubricants" as published by Economic Advisor , Ministry of Industry , Govt. Of India prevalent on the last date of submission of bid (inclusive of price part) or the revised price bid (inclusive of revised offer if any), whichever is later.

2.3 WHILE CALCULATING THE VALUE OF "W" THE FOLLOWING MAY BE

NOTED:

The cost on which the escalation/price variation shall be payable shall be reckoned as 85% of the cost of work as per the bills to which escalation relates, and from this amount the value of materials supplied or services rendered at the prescribed charges under the relevant provisions of the contract, and proposed to recovered in the particular bill, shall be deducted before the amount of compensation for escalation/price variation is worked out. Further the cost shall not include any work for which payment is made at prevailing market rates.

2.4 In the event the price of materials and/ or wages of labour required for execution of the work decreases, there shall be downward adjustment of the work so that such price of materials and/or wages of labour shall be deductible from the cost of work under this contract and in this regard the formulae hereinbefore stated under this clause shall mutatis /mutandis apply.

For all other works not listed above, the component of labour, material and POL of the total cost of work shall be as specifically indicated in the tender document.

The price variation clause as stated above will be applied for extended time frame of a contract by following the principles as under:

- i) Normally, if and when it is understood that a contract is not going to be completed within the scheduled time period, the contract is kept operative by extending the time of completion provisionally. During this provisional extended period the operation of the Price Variation Clause will remain suspended.
- ii) If and when it is decided at the end of the successful completion of the work that the delay was due to causes not attributable to the contractor, then the Price Variation Clause will be revived and applied as if the scheduled date of completion has been shifted to the approved extended date.
- iii) If it is decided at the end of successful completion of the work that the delay was due to the fault of the contractor then the Price Variation Clause will not be revived and no payment will be made to the contractor on this account. Additionally the Clause related to Compensation for delay will be applied.
- iv) In some cases the total delay may be partially due to causes not attributable to the contractor and partially due to his fault. It may be difficult to exactly quantify the total delay proportionately in such cases. The Price Variation Clause under such condition will be made operative for the entire extended time period by freezing the relevant indices on the date of the scheduled date of completion as originally fixed in the contract/ agreement. At the same time the Clause related to the compensation for delay will also be applied.

2.5 CEILING ON PRICE VARIATION DUE TO ESCALATION

There shall be a ceiling on price variation due to escalation covered under clauses mentioned hereinbefore on the contract, limited to 10% of that portion of Contract Price for which price variation is applicable.

2.6 VARIATION IN THE TAXES, DUTIES, LEVIES ETC.

Other statutory variation due to increase in taxes, duties, levies etc. by Govt. (Central or State or Local) as on the last date of submission of bid, with the taxes, duties, levies etc. during the manufacture/works/ supply, as the case may be, shall be born by the owner. Similarly decrease in taxes, duties, levies etc. shall be returned/deducted to/by the owner

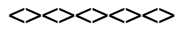
If work is delayed due to the fault of the Contractor, the owner shall not bear the extra burden of hike in the rates of taxes, if any.

Table - 1

Value of A , B & C in the Price variation formula in the 'Additional Terms and

Conditions of Contract:

Sl. No.	Particulars	A (Labour component)	B (Material component)	C (POL component)	Remarks
1.	For Building works	25	75	NIL	
2.	For Road works	15	80	05	
3.	For external sewerage, external water supply and external electrification	10	90	NIL	
4.	For external water supply, external sanitary and external electrification (Through labour rate contract)	75	25	NIL	
5.	For steel structural works	15	85	NIL	
6.	For steel structural works with Department free supply of rolled steel sections (Through labour rate contract)	75	25	NIL	
7.	For Coal Handling Plant Civil works	25	75	NIL	
8.	For Erection and Commissioning of P&M	65	35	NIL	



SUB-SECTION -3.3

GENERAL TECHNICAL CONDITIONS

SUB-SECTION – 3.3

GENERAL TECHNICAL CONDITIONS

1.0 GENERAL

This part covers technical conditions pursuant to the contract and will form an integral part of the contract. The following provisions shall supplement all the detailed technical specifications and requirements brought out in the accompanying technical specifications. The contractor's proposal shall be based on the use of equipment and materials complying fully with the requirements, specified herein. It is recognized that the contractor may have standardized on the use of certain components, materials, processes or procedures different than those specified herein. Alternate proposals offering similar equipment based on the manufacturer's standard practice will also be considered, provided such proposals meet the specified designs, standards and performance requirements and are acceptable to the owner.

2.0 LIMIT OF CONTRACT

Equipments furnished shall be complete in every respect with all mountings, fittings, fixtures and standard accessories normally provided with such equipments and/or needed for erection, completion and safe operation of the equipment as required by applicable codes though they may not have been specifically detailed in the technical specifications unless included in the list of exclusions. All similar standard components/parts of similar standard equipment provided, shall be inter-changeable with one another.

3.0 EQUIPMENT PERFORMANCE GUARANTEE

3.1 The performance tests of the equipment under the scope of the contract are detailed in the technical specifications. These guarantee shall supplement the general performance guarantee provisions covered under general terms & conditions of contract in clause entitled "Guarantee".

3.2 Liquidated damages for not meeting performance guarantee during the performance and guarantee tests shall be assessed and recovered from the contractor, as detailed in the technical specifications. Such liquidated damages shall be without any limitation whatsoever and shall be in addition to damages, if any payable under any other clauses of conditions of contract.

4.0 ENGINEERING DATA

4.1 The furnishing of engineering data by the contractor shall be in accordance with the schedule for each set of equipment as specified in the technical specifications. The review of these data by the engineer will cover only general conformance of the data to the specifications and documents, interfaces with the equipment provided under the specifications, external connections and of the dimensions which might affect plant layout. This review by the engineer may not indicate a thorough review of all dimensions, quantities and details of the equipment, materials, any devices or items indicated or the accuracy of the information submitted. This review and/or approval by the engineer shall not be construed by the

contractor, as limiting any of his responsibilities and liabilities for mistakes and deviations from the requirements, specified under these specifications and documents.

- 4.2 All engineering data submitted by the contractor after final process including review and approval by the engineer shall form part of the contract documents and the entire works covered under these specifications shall be performed in strict conformity, unless otherwise expressly requested by the engineer in writing.

5.0 DRAWING

- 5.1 All drawings submitted by the contractor including those submitted at the time of bid shall be sufficiently detailed to indicate the type, size, arrangement, weight of each component, break-up for packing and shipment, the external-connections, fixing arrangements required, the dimensions required for installation and inter-connections with other equipment and materials, clearances and spaces required between various portions of equipment and any other information specifically requested in the specifications.
- 5.2 Each drawing submitted by the contractor shall be clearly marked with the name of the owner, the unit designation, the specifications title, the specification number and the name of the project. If standard catalogue pages are submitted the applicable items shall be indicated therein. All titles, noting, markings and writings on the drawings shall be in English. All the dimensions should be in metric units.
- 5.3 The Contractor shall make his drawings in AutoCAD format and shall supply the drawings in CDs along with hardcopies.
- 5.3.1 Copies of drawings returned to the contractor will be in the form of a print with the owner's marking or print made from CDs for computer based drawings.
- 5.4 The drawings submitted by the contractor shall be reviewed by the engineer as far as practicable within four (4) weeks and shall be modified by the contractor if any modifications and/or corrections are required by the engineer. The contractor shall incorporate such modifications and/or corrections and submit the final drawings for approval. Any delay arising out of failure by the contractor to rectify the drawings in good time shall not alter the contract completion date.
- 5.5 Approval by the Nodal Officer or his Nominee the contractor shall submit specifications and drawings showing the proposed Temporary Works to the Nodal Officer/Engineer-In-Charge or his nominee, who is to approve them if they comply with the specification and drawings. The contractor shall be responsible for design of Temporary Works.
The Nodal Officer/Engineer-In-Charge or nominee's approval shall not alter the contractor's responsibility for design of the Temporary Works.
- 5.6 The drawings sent for approval to the engineer shall be in quintuplicate. One print of such drawings will be returned to the contractor by the engineer marked approved/ approved with corrections. The contractor shall thereupon furnish the owner with nine prints and one reproducible original of the drawings after incorporating all corrections.

- 5.7 Further work by the contractor shall be in strict accordance with these drawings and no deviation shall be permitted without the written approval of the engineer, if so required.
- 5.8 All manufacturing and fabrication work in connection with the equipments prior to the approval of the drawings shall be at the contractor's risk. The contractor may make any changes in the design which are necessary to make the equipment conform, to the provisions and intent of the contract and such changes will again be subject to approval by the engineer. Approval of contractor's drawings or work by the engineer shall not relieve the contractor of any of his responsibilities and liabilities under the contract.
- 5.9 Drawings shall include all installation and detailed piping drawings wherever applicable. All pipings 100 mm and larger shall be routed in detail and smaller pipe shall be shown schematically or by isometric drawings. All drawings shall be fully corrected to agree with actual as built construction.
- 5.10 **Operating and Maintenance Manual:** If "as built" drawings and/or operating and maintenance manuals are required the contracts shall supply them by the dates stated in the contract data.

If the contractor does not supply the drawings and/or manuals by the dates stated in the contract data, or they do not receive the Nodal Officer or his nominee's approval, the Nodal Officer or his nominee shall withhold the amount stated in the contract data from payments due to the contractor.

6.0 INSTRUCTION MANUALS

- 6.1 The contractor shall submit to the engineer, preliminary instruction manuals for all the equipments, covered under the contract within the time agreed upon between the owner & the contractor. The final instruction manuals complete in all respects shall be submitted by the contractor thirty (30) days before the first shipment of the equipment. The instruction manuals shall contain full details and drawings of all the equipment furnished, the erection procedures, testing procedures, operation and maintenance procedures of the equipment. These instruction manuals shall be submitted in the form of one (1) reproducible original and twelve (12) copies.
- 6.2 If after the commissioning and initial operation of the plant, the instruction manuals require any modifications/ additions/changes, the same shall be incorporated and the updated final instruction manuals in the form of one (1) reproducible original and twelve (12) copies shall be submitted by the contractor to the owner.
- 6.3 The contractor shall furnish to the owner, twelve (12) sets of spare parts catalogue.
- 6.4 In addition, the contractor shall supply two sets of all the documents, specifications, operation and maintenance manuals (in hard copies also) and as built drawings in CDs to BCCL. The documents supplied shall be in easily readable, search & printable format.

7.0 FIRST FILL OF CONSUMABLE, OILS AND LUBRICANTS

All the first fill of consumable such as oils, lubricants and essential chemicals etc., which will be required to put the equipment covered under the scope of the specifications, into successful trial operation, shall be furnished by the contractor unless specifically excluded under the exclusions in the specifications and other documents.

8.0 MANUFACTURING SCHEDULE

The contractor shall submit to the engineer his manufacture and delivery schedules for all equipment within thirty (30) days from the date of the letter of acceptance of tender. Such schedules shall be in line with the detailed network for all phases of the work of the contractor. Such schedules shall be reviewed, up-dated and submitted to the engineer, once every two (2) months thereafter, by the contractor. Schedule shall also include the materials and equipment purchased from outside suppliers.

9.0 REFERENCE STANDARDS

9.1 The codes and/or standards referred to in these specifications shall govern, in all cases wherever such references are made. In case of a conflict between such codes and/or standards and the specifications, the latter shall govern. Such codes and/or standards referred to shall mean the latest revisions, amendments/changes adopted and published by the relevant agencies. In case of any further conflict in this matter, the same shall be referred to the engineer whose decision shall be final and binding.

9.2 Other internationally acceptable standards which ensure equal or higher performance than those specified shall also be accepted.

9 A DESIGN IMPROVEMENT

9A.1 The engineer or contractor may propose changes in the specification of the equipment of quality thereof and if the parties agree upon any such changes the specification shall be modified accordingly.

9A.2 If any such agreed upon change is such that it affects the price and schedule of completion, the parties shall agree in writing as to the extent of any change in the price and/or schedule of completion before the contractor proceeds with the change. Following such agreement the provision thereof, shall be deemed to have been amended accordingly.

10.0 QUALITY ASSURANCE

10.1 Quality Assurance Programme

To ensure that the equipment and services under the scope of this contract whether manufactured or performed within the contractor's works or at his sub-contractor's premises or at the owner's site or at any other place of work are in accordance with the specifications, the contractor shall adopt suitable quality assurance programme to control such activities at all points necessary. Such programme shall be outlined by the contractor and shall be finally accepted by the engineer after discussions before the issue of letter of acceptance of tender. A quality assurance programme of the contractor shall generally cover the following:

- a. his organization structure for the management and implementation of the proposed quality assurance programme:
- b. documentation control system:
- c. qualification data for bidder's key personnel:
- d. the procedure for purchase of materials, parts components and selection of sub-contractor's services including vendor analysis, source inspection, incoming raw-material inspection, verification of materials purchased etc.:
- e. system for shop manufacturing and site erection control including process control and fabrication and assembly controls:
- f. control of non-conforming items and system for corrective actions:
- g. inspection and test procedure both for manufacture and field activities:
- h. control of calibration and testing of measuring and testing equipment:
- i. system for indication and appraisal of inspection status:
- j. system for quality audits:
- k. system for authorising release of manufactured product to the owner:
- l. system for maintenance of records:
- m. system for handling storage and delivery: and
- n. a quality plan detailing out the specific quality control procedure adopted for controlling the quality characteristics relevant to each item of equipment furnished and each work at different stages executed at work site.

10.2 **Quality Assurance Documents**

The contractor shall be required to submit the following Quality Assurance Documents within three weeks after dispatch of the equipment:

- i. all non-destructive examination procedures including stress relief and weld repair procedures actually used during fabrication.
- ii. welder and welding operator qualification certificates.
- iii. welder identification list, listing welder's and welding operator's qualification procedure and welding identification symbols.
- iv. material mill test reports on components as specified by the specification.
- v. the inspection plan with verification, inspection plan check points, verification sketches, if used, and methods used to verify that the inspection and testing points in the inspection plan were performed satisfactorily.
- vi. sketches and drawings used for indicating the method of traceability of the radiographs to the location on the equipment.
- vii. all non-destructive examination result reports including radiography interpretation reports.
- viii. stress relief time temperature charts.
- ix. factory test results for testing required as per applicable codes and standards referred in the specifications.

- x. the engineer or his duly authorized representative reserves the right to carry out quality audit and quality surveillance of the systems and procedures of the contractor/his vendor's quality management and control activities.

11.0 ENGINEER'S SUPERVISION

- 11.1 To eliminate delays and avoid disputes and litigation it is agreed between the parties to the contract that all matters and questions shall be referred to the engineer and his decision shall be final.
- 11.2 The work shall be performed under the direction and supervision of the engineer. The scope of the duties of the engineer, pursuant to the contract, will include but not be limited to the following:
 - a. interpretation of all the terms and conditions of these documents and specifications.
 - b. review and interpretation of all the contractor's drawings, engineering data etc.
 - c. witness or authorize his representative to witness tests and trials either at the manufacturer's works or at site, or at any place where work is performed under the contract.
 - d. inspect, accept or reject any equipment, material and work under the contract.
 - e. issue certificate of acceptance and/or progressive payment and final payment certificates.
 - f. review and suggest modifications and improvements in completion schedules from time to time.
 - g. supervise the quality assurance programme implementation at all stages of the works.
 - h. to receive and endorse the dispatch documents enabling the contractor to clear the consignments.

12.0 INSPECTION, TESTING AND INSPECTION CERTIFICATE

- 12.1 The engineer, his duly authorized representative and/or outside inspection agency acting on behalf of the owner shall have at all reasonable times access to the contractor's premises or works and shall have the power at all reasonable times to inspect and examine the materials and workmanship of the works during its manufacture or erection and if part of the works is being manufactured or assembled at other premises or works, the contractor shall obtain for the engineer and for his duly authorized representative permission to inspect as if the works were manufactured or assembled on the contractor's own premises or works.
- 12.2 The contractor shall give the Engineer/Inspector fifteen (15) days written notice of any material being ready for testing. Such tests shall be to the contractor's account except for the expenses of the Inspector. The Engineer/Inspector, unless witnessing of the tests is virtually waived, will attend such tests within fifteen (15) days of the date on which the equipment is notified as being ready for test/inspection, failing which the contractor may proceed with the test which shall be deemed to have been made in the Inspector's presence and he shall forthwith forward to the Inspector duly certified copies of tests in triplicate.

- 12.3 The Engineer or Inspector shall within fifteen (15) days from the date of inspection as defined herein give notice in writing to the contractor, of any objection to any drawings and all or any equipment and workmanship which in his opinion is not in accordance with the contract. The contractor shall give due consideration to such objections and shall either make the modifications that may be necessary to meet the said objections or shall confirm in writing to the Engineer/Inspector giving reasons therein, that no modifications are necessary to comply with the contract.
- 12.4 When the factory tests have been completed at the contractor's or sub-contractor's works, the Engineer/Inspector shall issue a certificate to this effect within fifteen (15) days after completion of tests but if the tests are not witnessed by the Engineer/Inspector, the certificate shall be issued within fifteen (15) days of the receipt of the contractor's test certificate by the Engineer/Inspector. Failure of the Engineer/Inspector to issue such a certificate shall not prevent the contractor from proceeding with the works. The completion of these tests or the issue of the certificate shall not bind the owner to accept the equipment should it, on further tests after erection, be found not to comply with the contract.
- 12.5 In all cases where the contract provides for tests whether at the premises or works of the contractor or of any sub-contractor, the contractor, except where otherwise specified, shall provide free of charge such items as labour, materials, electricity, fuel, water, stores, apparatus and instruments as may be reasonably demanded by the Engineer/Inspector or his authorized representative to carry out effectively such tests of the equipment in accordance with the contract and shall give facilities to the Engineer/Inspector or to his authorized representative to accomplish testing.
- 12.6 The inspection by Engineer and issue of Inspection Certificate thereon shall in no way limit the liabilities and responsibilities of the contractor in respect of the agreed quality assurance programme forming a part of the contract.

13.0 TEST

13.1 Start up

- 13.1.1 On completion of erection of the equipment and before start-up, each item of the equipment shall be thoroughly cleaned and then inspected jointly by the Engineer and the contractor for correctness and completeness of installation and acceptability of start-up, leading to initial pre-commissioning tests at site. The list of pre-commissioning tests to be performed shall be as mutually agreed and included in the contractor's quality assurance programme.
- 13.1.2 The contractor's commissioning/start-up engineers specifically identified as far as possible shall be responsible for carrying out all the pre-commissioning tests. On completion of inspection, checking and after the pre-commissioning tests are satisfactorily over, the complete equipment shall be placed on initial operation during which period the complete equipment shall be operated integral with sub-systems and supporting equipment as a complete plant referred hereinafter as plant.

13.2 Trial Operation

- 13.2.1 The plant shall then be on trial operation during which period all necessary adjustments shall be made while operating over the full load-range enabling the plant to be made ready for performance and guarantee tests.
- 13.2.2 The duration of trial operation of the complete equipment shall be fourteen (14) days out of which at least seventy two (72) hours shall be continuous operation on full load or any other duration as may be agreed to, between the engineer and the contractor. The trial operation shall be considered successful, provided that each item of the equipment can operate continuously at the specified operating characteristics, for the period of trial operation.
- 13.2.3 For the period of trial operation, the time of operation with any load shall be counted. Minor interruptions not exceeding four (4) hours at a time, caused during the continuous operation shall not affect the total duration of trial operation. However, if in the opinion of the engineer, the interruption is long, the trial operation shall be prolonged for the period of interruption.
- 13.2.4 A trial operation report comprising of observations and recordings of various parameters to be measured in respect of the above trial operation shall be prepared by the contractor. This report, besides recording the details of the various observations during trial run, shall also include the dates of start and finish of the trial operations and shall be signed by the representatives of both the parties. The report shall have sheets, recording all the details of interruptions occurred, adjustments made and any minor repairs done during the trial operation. Based on the observations, necessary modifications/ repairs to the plant shall be carried out by the contractor to the full satisfaction of the engineer to enable the later to accord permission to carry out performance and guarantee tests on the plant. However, minor defects which do not endanger the safe operation of the equipment, shall not be considered as reasons for with holding the aforesaid permission.

13.3 Performance and guarantee test

- 13.3.1 The final test as to the performance and guarantees shall be conducted at site, by the owner. Such tests will be commenced within a period of two (2) months after successful completion of trial operations. Any extension of time beyond the above two (2) months shall be mutually agreed upon.
- 13.3.2 These tests shall be binding on both the parties of the contract to determine compliance of the equipment with the performance guarantees.
- 13.3.3 The available instrumentation and control equipment will be used during such tests and the engineer will calibrate, all such measuring equipments and devices as far as practicable. However, non-measurable parameters shall be taken into account in a reasonable manner by the engineer, for the equipment of these tests. The tests will be conducted at the specified load points and as near the specified cycle condition as practicable. The engineer will apply proper corrections in calculation, to take into account conditions which do not correspond to the specified conditions.

- 13.3.4 Any special equipment, tools and tackles required for the successful completion of the performance and guarantee tests shall be provided by the contractor, free of cost.
- 13.3.5 The guaranteed performance figures of the equipment shall be proved by the contractor during these performance and guarantee tests. Should the results of these tests show any decrease from the guaranteed values, the contractor shall modify the equipment as required to enable it to meet the guarantees. In such case, performance and guarantee tests shall be repeated within one month, from the date the equipment is ready for re-tests and all cost for modifications including labour, materials and the cost of additional testing to prove that the equipment meets the guarantees, shall be borne by the contractor. Duration of performance guarantee tests will be of one month , of which 6 (six) days continuous on load operation is the minimum requirement and in case it fails , the process of performance guarantee tests will be repeated.
- 13.3.6 The specific tests to be conducted on equipment has been brought out in the technical specifications.
- 13.3.7 Performance and guarantee test shall make allowance for instrumentation errors as may be decided by the engineer-in-charge.

13.4 TEST CODES

The provisions outlined in the ASME performance test codes or other international and Indian approved equivalents shall generally be used as a guide for all the above test procedures unless otherwise specified in the technical specifications.

14.0 PACKING

- 14.1 All the equipment shall be suitably protected, coated, covered or boxed and crated to prevent damage or deterioration during transit, handling and storage at site till the time of erection. While packing all the materials, the limitation from the point of view of availability of railway wagon sizes in India should be taken into account. The contractor shall be responsible for any loss or damage during transportation, handling and storage due to improper packing.

15.0 PROTECTION

All coated surfaces shall be protected against abrasions, impact, discoloration and any other damages. All exposed threaded portions shall be suitably protected with either a metallic or a non-metallic protecting device. All ends of all valves and pipings and conduit equipment connections shall be properly sealed with suitable devices to protect them from damage. The parts which are likely to get rusted, due to exposure to weather, should also be properly treated and protected in a suitable manner.

16.0 PRESERVATIVE SHOP COATING

- 16.1 All exposed metallic surfaces subject to corrosion shall be protected by shop application of suitable coatings. All surfaces which will not be easily accessible after the shop assembly, shall beforehand be treated and protected for the life of the equipment. All surfaces shall be thoroughly cleaned of all mill scale, oxide and other coatings and prepared in the shop. The surfaces that are to be finish painted after installation or require corrosion protection until

installation, shall be shop painted with at least two coats of primer. Transformers and other electrical equipment, if included shall be shop finished with one or more coats of primer and two coats of high grade resistance enamel. The finished colours shall be as per manufacturer's standards, to be selected and specified by the engineering at a later date.

16.2 Shop primer for all steel surfaces which will be exposed to operating temperature below 95°C shall be selected by the contractor, after obtaining specific approval of the engineer regarding the quality of primer proposed to be applied. Special high temperature primer shall be used on surfaces exposed to temperatures higher than 95°C and such primers shall also be subject to the approval of the engineer.

16.3 All other steel surfaces which are not to be painted shall be coated with suitable dust preventive compound subject to the approval of the engineer.

7.0 PROTECTIVE GUARDS

Suitable guards shall be provided for protection of personnel on all exposed rotating and/or moving machine parts. All such guards with necessary spares and accessories shall be designed for easy installation and removal for maintenance purposes.

18.0 DESIGN CO-ORDINATION

The contractor shall be responsible for the selection and design of appropriate equipment to provide the best co-ordinated performance of the entire system. The basic design requirements are detailed out in Technical Specifications. The design of various components, sub-assemblies and assemblies shall be so done, so that it facilitates easy field assembly and maintenance. All the rotating components shall be so selected that the natural frequency of the complete unit is not critical at or close to the operating range of the unit.

19.0 DESIGN CO-ORDINATION MEETING

The contractor will be called upon to attend design co-ordination meetings with the engineer, other contractors and the consultants of the owner during the period of contract. The contractor shall attend such meetings at his own cost at the office of the General Manager(Washery), Washery Construction Division, Level-6, BCCL, KoylaBhawan, Dhanbad-826005 or at mutually agreed venue as and when required and fully co-operate with such persons and agencies involved during those discussions.

20.0 TOOLS AND TACKLES

The contractor shall supply with the equipments, one complete set of all special tools and tackles for the erection, assembly, dis-assembly and maintenance of the equipment. However, these tools and tackles shall be separately packed and brought on to site.

21.0 NOISE LEVEL

The equivalent 'A' weighted sound level measured at a distance of 1.5 meters above floor level in elevation and one meter horizontally from the base of any equipment furnished and installed under these specifications, expressed in decibels to a reference of 0.0002 microbar, shall not exceed 85 dBA.

22.0 TAKING OVER

Upon successful completion of all the tests to be performed at site on equipment furnished and erected by the contractor, the engineer shall issue to the contractor a taking over certificate as a proof of the final acceptance of the equipment. Such certificate shall not unreasonably be withheld nor will the engineer delay the issuance thereof, on account of minor omissions or defects which do not affect the commercial operation and/or cause any serious risk to the equipment. Such certificate shall not relieve the contractor of any of his obligations which otherwise survive, by the terms and conditions of the contract after issuance of such certificate.

23.0 INDIAN STANDARDS

Normally Indian Standards as published by BUREAU OF INDIAN STANDARDS shall be followed. Wherever relevant Indian Standard is not published by the BIS, International Standards or American Standard or German Standard or British Standard, as decided by the Engineer in consultations with the Consultants employed by the Owner, shall be followed.

24.0 WELDING

If the manufacturer has special requirements relating to the welding procedures for welds at the terminals of the equipment to be procured by the owner under separate specifications, the requirements shall be submitted to the engineer in advance of commencement of erection work.

25.0 LUBRICATION

Equipments shall be lubricated by systems designed for continuous operation. Lubricant level indicators shall be furnished and marked to indicate proper levels under both stand-still and operating conditions.

26.0 EQUIPMENT BASES

A cast iron or welded steel base plate shall be provided for all rotating equipment which is to be installed on a concrete/structural steel base unless otherwise agreed to by the engineer. Each base plate shall support the unit and its drive assembly, shall be of a neat design with pads for anchoring the units, shall have a raised lip all around, and shall have threaded drain connections.

27.0 RATING PLATES, NAME PLATES AND LABELS

27.1 Each main and auxiliary items of plant is to have permanently attached to it in a conspicuous position a rating plate of non corrosive material upon which is to be engraved the manufacturer's name, equipment, type or serial number, together with details of the loading conditions under which the item of plant in question have been designed to operate, and such diagram plates as may be required by the engineer.

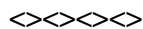
- 27.2 Each item of plant is to be provided with a nameplate or label designating the service of the particular equipment. The inscriptions are to be approved by the engineer or shall be as detailed in the appropriate sections of the technical specifications.
- 27.3 Such nameplates or labels are to be of white non-hygroscopic material with engraved black lettering or, alternatively, in the case of indoor circuit breakers, starters etc. of transparent plastic material with suitably coloured lettering engraved on the back.
- 27.4 Items of plant such as valves, which are subject to handling, are to be provided with an engraved chromium plated nameplate or label with engraving filled with enamel.
- 27.5 All such name plates, instruction plates, lubrication charts etc. shall be bilingual with Hindi inscription first, followed by English. Alternatively two separate plates one with Hindi and the other with English inscriptions may be provided.

28.0 COLOUR CODE FOR PIPE SERVICES

All pipe services wherever applicable are to be painted in accordance with the owner's standard colour scheme, by the contractor.

29.0 SERVICE BY THE OWNER

- 29.1 The following services shall be provided by the owner:
- i. Construction/ drinking water at one point within 100 meters of the work site, charges to be decided by the company.
 - ii. Auxiliary power for construction at one point within 100 meters of the work site , charges to be decided by the company.
- 29.2 In the event of the contractor requiring these services at parameters other than those specified above, for any systems, equipment, instrument etc. he shall make the necessary arrangements himself.



SUB-SECTION – 3.4
ERECTION CONDITIONS OF CONTRACT

SUB-SECTION – 3.4

ERECTION CONDITIONS OF CONTRACT

1.0 GENERAL

- 1.1 The following shall supplement the conditions already contained in the other parts of these specifications and documents and shall govern that portion of the work of this contract to be performed at site.
- 1.2 The contractor upon signing of the contract shall, in addition to a project co-ordinator, nominate another responsible officer as his representative at site suitably designated for the purpose of overall responsibility and co-ordination of the works to be performed at site. Such person shall function from the site office of the contractor during the pendency of contract.

2.0 REGULATION OF LOCAL AUTHORITIES AND STATUTES

- 2.1 The contractor shall comply with all the rules and regulations of local authorities during the performance of his field activities. He shall also comply with the minimum wages act, 1948 and the payment of wages act (both of the Government of India and the local State Government) and the rules made there under in respect of any employee or workman employed or engaged by him or his sub-contractor. The contractor shall make all necessary payments of the Provident Fund for the workmen employed by him for the work as per the laws prevailing under provisions of CMPF and Allied Schemes and CMPF and Miscellaneous Provisions Act 1948 or Employees Provident Fund and Miscellaneous Provisions Act 1952 as the case may be.
- 2.2 All registration and statutory inspection fees, if any, in respect of his work pursuant to this contract shall be to the account of the contractor. However, any registration, statutory inspection fees lawfully payable under the provisions of the rules and regulations of the Government and any other statutory laws and its amendments from time to time during erection in respect of the plant equipment ultimately to be owned by the owner, shall be to the account of the owner. Should any such inspection or registration need to be arranged due to the fault of the contractor or his sub-contractor, the additional fees for such inspection and/or registration shall be borne by the contractor.

3.0 OWNER'S LIEN ON EQUIPMENT

The owner shall have lien on all equipment including those of the contractor brought to the site for the purpose of erection, testing and commissioning of the plant. The owner shall continue to hold the lien on all such equipment throughout the period of contract. No material brought to the site shall be removed from the site by the contractor and/or his sub-contractors without the prior written approval of the engineer.

4.0 INSPECTION, TESTING AND INSPECTION CERTIFICATES

The provisions of the clause entitled inspection testing and inspection certificates under section GTC shall also be applicable to the erection portion of the works. The engineer shall have the right to re-inspect any equipment though previously inspected and approved by him, at the contractor's

works, before and after the same are constructed and/or erected at site. If by the above inspection, the engineer rejects any work or equipment, the contractor shall make good for such rejection either by replacement or modifications/repairs as may be necessary, to the satisfaction of the engineer. Such replacement will also include the replacement or re-execution of such of those works of other contractors and/or agencies, which might have got damaged or affected by the replacements or re-work done to the contractor's work.

5.0 ACCESS TO SITE AND WORKS ON SITE

- 5.1 Suitable access to and possession of the site shall be accorded to the contractor by the owner in reasonable time.
- 5.2 The owner shall have the necessary foundations to be provided by him ready, as per the agreed schedule for the execution of the individual phases of works.
- 5.3 The works so far as it is carried out on the owner's premises, shall be carried out at such time as the owner may approve and the owner shall give the contractor reasonable facilities for carrying out the works.
- 5.4 In the execution of the works, no persons other than the contractor or his duly appointed representative, sub-contractor and workmen, shall be allowed to do work on the site, except by the special permission, in writing of the engineer or his representative.

6.0 CONTRACTOR'S SITE OFFICE ESTABLISHMENT

The contractor shall establish a site office at the site and keep posted an authorized representative for the purpose of the contract. Any written order or instruction of the engineer or his duly authorized representative, shall be communicated to the said authorized resident representing the contractor and the same shall be deemed to have been communicated to the contractor at his legal address.

7.0 CO-OPERATION WITH OTHER CONTRACTORS

- 7.1 The contractor shall co-operate with all other contractors or tradesmen of the owner, who may be performing other works on behalf of the owner and the workmen who may be employed by the owner and doing work in the vicinity of the works under the contract. The contractor shall also so arrange to perform his work as to minimize, to the maximum extent possible, interference with the work of other contractors and his workmen. Any injury or damage that may be sustained in the employees of the other contractors and the owner, due to the contractor's work shall promptly be made good at his own expense. The engineer shall determine the resolution of any difference or conflict that may arise between the contractor and other contractors or between the contractor and the workmen of the owner in regard to their work. If the works of the contractor is delayed because of any acts or omissions of another contractor, the contractor shall have no claim against the owner on that account other than an extension of time for completing his works.
- 7.2 The engineer shall be notified promptly by the contractor of any defects in the other contractor's works that could affect the contractor's works. The engineer shall determine the corrective measures

if any, required to rectify this situation after inspection of the works and such decisions by the engineer shall be binding on the contractor.

8.0 DISCIPLINE OF WORKMEN

The contractor shall adhere to the disciplinary procedure set by the engineer in respect of his employees and workmen at site. The engineer shall be at liberty to object to the presence of any representative or employees of the contractor at the site, if in the opinion of the engineer such employee has mis-conducted himself or be incompetent or negligent or otherwise undesirable and then the contractor shall remove such a person objected to and provide in his place a competent replacement.

9.0 CONTRACTOR'S FIELD OPERATION

9.1 The contractor shall keep the engineer informed in advance regarding his field activity plans and schedules for carrying out each part of the works. Any review of such plan or schedule or method of work by the engineer shall not relieve the contractor of any of his responsibilities towards the field activities. Such reviews shall also not be considered as an assumption of any risk or liability by the engineer or the owner or any of his representatives and no claim of the contractor will be entertained because of the failure or inefficiency of any such plan or schedule or method of work reviewed. The contractor shall be solely responsible for the safety, adequacy and efficiency of plant and equipment and his erection methods.

9.2 The contractor shall have complete responsibility for the conditions of the work site including the safety of all persons employed by him or his sub-contractor and all the properties under his custody during the performance of the work. This requirement shall apply continuously till the completion of the contractor and shall not be limited to normal working hours. The construction review by the engineer is not intended to include review of contractor's safety measures in, on or near the work-site, and their adequacy or otherwise.

10.0 PHOTOGRAPHS AND PROGRESS REPORT

10.1 The contractor shall furnish three (3) prints each to the engineer of progress photographs of the work done at site. Photographs shall be taken as and when indicated by the engineer or his representative. Photographs shall be adequate in size and number to indicate various stages of erection. Each photograph shall contain the date, the name of the contractor and the title of the photograph.

10.2 The above photographs shall accompany the monthly progress report detailing out the progress achieved on all erection activities as compared to the schedules. The report shall also indicate the reasons for the variance between the scheduled and actual progress and the action proposed for corrective measures wherever necessary.

11.0 MAN-POWER REPORT

11.1 The contractor shall submit to the engineer, on the first day of every month, a man hour schedule for the month, detailing the man hours scheduled for the month, skill wise and area-wise.

- 11.2 The contractor shall also submit to the engineer on the first day of every month, a man power report of the previous months detailing the number of persons scheduled to have been employed and actually employed, skill-wise and areas of employment of such labour.

12.0 PROTECTION WORK

The contractor shall have total responsibility for protecting his works till it is finally taken over by the engineer. No claim will be entertained by the owner or the engineer for any damage or loss to the contractor's works and the contractor shall be responsible for the complete restoration of the damaged works to its original condition to comply with the specifications and drawings. Should any such damage to the contractor's works occur because of other party not under his supervision or control, the contractor shall make his claim directly with the party concerned. If dis-agreement or conflict or dispute develops between the contractor and the other party or parties concerned regarding the responsibility for damage to the contractor's works the same shall be resolved as per the provisions of the clause 7.0 above entitled "**Co-operation with other contractors**". The contractor shall not cause any delay in the repair of such damaged works because of any delay in the resolution of such disputes. The contractor shall proceed to repair the work immediately and the cause thereof will be assigned pending resolution of such dispute.

13.0 EMPLOYMENT OF LABOUR

- 13.1 The contractor will be expected to employ on the work only his regular skilled employees with experience of his particular work. No female labour shall be employed after darkness .No persons below the age of eighteen years shall be employed.
- 13.2 All traveling expenses including provisions of all necessary transport to and from site, lodging allowances and other payments to the contractor's employees shall be the sole responsibility of the contractor.
- 13.3 The hour of work on the site shall be decided by the owner and the contractor shall adhere to it. Working hours will normally be eight (8) hours per day- Monday through Saturday.
- 13.4 Contractor's employees shall wear identification badges while on work, on site.
- 13.5 In case the owner becomes liable to pay any wages or dues to the labour or to any Government agency under any of the provisions of the Minimum Wages Act, Workmen compensation Act, Contract Labour Regulation Abolition Act, CMPF Act or any other law due to act of omission of the contractor, the owner may make such payments and shall recover the same from the contractor's bills.

14.0 FACILITIES TO BE PROVIDED BY THE OWNER

14.1 SPACE :

The contractor shall advise the owner within thirty (30) days from the date of acceptance of the letter of award, about his exact requirement of space for his office, mess-rooms storage area, pre-assembly and fabrication areas, labour colony area, toilets, etc. The above requirement shall be reviewed by the engineer and space will be allotted to the contractor for construction of his

temporary structures like office, storage sheds, labour and staff colony and other utilities etc. for his own as well as his sub-contractor's use.

14.2 **ELECTRICITY**

The contractor shall submit to the engineer within thirty (30) days from the date of acceptance of the award letter, his electrical power requirements, if any, to allow BCCL to plan for providing power temporarily. The contractor shall be provided with supply of electricity for the purposes of the contract, only at one point in the project site. The contractor shall make his own further distribution arrangement. All temporary wiring must comply with local regulations and will be subject to engineer's inspection and approval before connection to supply. Power supply for labour colonies shall also be provided at one point. The contractor shall be charged for the power supplied at work site and labour colonies at prevalent rate of power supplied by State Electricity Board. The electricity shall be supplied at one point at 415 V.

14.3 **WATER**

Supply of water will be made available for the construction purposes at an agreed single point within 100 meters of the work site. And further distribution will be the responsibility of the contractor. The contractor shall be charged for the water supplied at work site @ 1% of the value of civil works and shall be deducted from the contractor's running/final bills.

15.0 **FACILITIES TO BE PROVIDED BY THE CONTRACTOR**

15.1 **Tools, tackles and scaffoldings**

The contractor shall provide all the construction equipment, tools, tackles and scaffoldings required for pre-assembly, erection, testing and commissioning of the equipment covered under the contract. He shall submit a list of all such materials to the engineer before the commencement of pre-assembly at site. These tools and tackles shall not be removed from the site without the written permission of the engineer.

15.2 **Communication**

The owner will extend the telephone & telex facilities, if available at site, for purposes of contract. The contractor shall be charged at actual for such facilities.

15.3 **First – aid**

15.3.1 The contractor shall provide necessary first-aid facilities for all his employees, representatives and workmen working at the site. Enough number of contractor's personnel shall be trained in administering first-aid.

15.3.2 The owner will provide the contractor, in case of an emergency, the services of an ambulance for transportation to the nearest hospital.

15.4 **Cleanliness**

15.4.1 The contractor shall be responsible for keeping the entire area allotted to him clean and free from rubbish, debris etc. during the period of contract. The contractor shall employ enough number of special personnel to thoroughly clean his work area at least once in a day. All such rubbish and

scrap material shall be stacked or disposed in a place to be identified by the engineer. Materials and stores shall be so arranged to permit easy cleaning of the area in areas where equipment might drip oil and cause damage to the floor surface, a suitable protective cover of a flame resistant, oil proof sheet shall be provided to protect the floor from such damage.

- 15.4.2 Similarly the labour colony, the offices and the residential areas of the contractor's employees and workmen shall be kept clean and neat to the entire satisfaction of the engineer. Proper sanitary arrangement shall be provided by the contractor, in the work areas, office and residential areas of the contractor.

16.0 LINES AND GRADES

All the works shall be performed to the lines, grades and elevations indicated on the drawings. The contractor shall be responsible to locate and layout the works. Basic horizontal and vertical control points will be established and marked by the engineer at site at suitable points. These points shall be used as datum for the works under the contract. The contractor shall inform the engineer well in advance of the times and places at which he wishes to do work in the area allotted to him, so that suitable datum points may be established and checked by the engineer to enable the contractor to proceed with his works. Any work done without being properly located may be removed and/or dismantled by the engineer at contractor's expense.

17.0 FIRE PROTECTION

- 17.1 The work procedures that are to be used during the erection shall be those which minimise fire hazards to the extent practicable. Combustible materials, combustible waste and rubbish shall be collected and removed from the site at least once each day. Fuels, oils and volatile or flammable materials shall be stored away from the construction and equipment and materials storage areas in safe containers. Untreated canvas paper, plastic or other flammable flexible materials shall not at all be used at site for any other purpose unless otherwise specified. If any such materials are received with the equipment at the site, the same shall be removed and replaced with acceptable material before moving into the construction area or storage.
- 17.2 Similarly corrugated paper fabricated cartons etc. will not be permitted in the construction area either for storage or for handling of materials. All such materials used shall be water proof and flame resistant type. All the other materials such as working drawings, plants, etc. which are combustible but are essential for the works to be executed shall be protected against combustion resulting from welding sparks, cutting flames and other similar fire sources.
- 17.3 All the contractor's supervisory personnel and sufficient number of workers shall be trained for fire-fighting and shall be assigned specific fire protection duties. Enough of such trained personnel must be available at the site during the entire period of the contract.

17.4 The contractor shall provide enough fire protection equipment of the types and number for the warehouses, office, temporary structures, labour colony area, etc. Access to such fire protection equipment, shall be easy and kept open at all times.

18.0 SECURITY

The contractor shall have total responsibility for all equipment and materials in his custody stored, loose, semi-assembled and/or erected by him at site. The contractor shall make suitable security arrangements including employment of security personnel to ensure the protection of all materials, equipment and works from theft, fire, pilferage and any other damages and loss. All materials of the contractor shall enter and leave the project site only with the written permission of the engineer in the prescribed manner.

19.0 CONTRACTOR'S AREA LIMITS

The engineer will mark-out the boundary limits of access roads, parking spaces, storage and construction areas for the contractor and the contractor shall not trespass the areas not so marked out for him. The contractor shall be responsible to ensure that none of his personnel move out of the areas marked out for his operations. In case of such a need for the contractor's personnel to work out of the areas marked out for him, the same shall be done only with the written permission of the engineer.

20.0 CONTRACTOR'S CO-OPERATION WITH THE OWNER

In cases where the performance of the erection work by the contractor affects the operation of the system facilities of the owner, such erection work of the contractor shall be scheduled to be performed only in the manner stipulated by the engineer and the same shall be acceptable at all times to the contractor. The engineer may impose such restrictions on the facilities provided to the contractor such as electricity, water, etc. as he may think fit in the interest of the owner and the contractor shall strictly adhere etc. such restrictions and co-operate with the engineer. It will be the responsibility of the contractor to provide all necessary temporary instrumentation and other measuring devices required during start-up and operation of the equipment systems which are erected by him. The contractor shall also be responsible for flushing and initial filling of all the oil and lubricants required for the equipment furnished and erected by him, so as to make such equipment ready for operation. The contractor shall be responsible for supplying such flushing oil and other lubricants unless otherwise specified elsewhere in these documents and specifications.

21.0 PRE-COMMISSIONING TRIALS AND INITIAL OPERATIONS

The pre-commissioning trials and initial operations of the equipment furnished and erected by the contractor shall be the responsibility of the contractor as detailed in relevant clauses in section GTC. The contractor shall provide, in addition, test instruments, calibrating devices, etc. and the labour required for the successful performance of these trials. It is anticipated that the above test may prolong for a long time, the contractor's workmen required for the above test shall always be present at site during such trials.

22.0 MATERIALS HANDLING AND STORAGE

- 22.1 All the equipment furnished under the contract and arriving at site shall be promptly received, unloaded and transported and stored in the storage spaces by the contractor.
- 22.2 Contractor shall be responsible for examining all the shipment and notify the engineer immediately or any damage, shortage, discrepancy, etc. for the purpose of engineer's information only. The contractor shall submit to the engineer every week a report detailing all the receipts during the week. However, the contractor shall be solely responsible for any shortages or damage in transit, handling and/or in storage and erection of the equipment at the site. Any demurrage, wharfage and other such charges claimed by the transporters, railways etc. shall be to the account of the contractor.
- 22.3 The contractor shall maintain an accurate and exhaustive record detailing out the list of all equipment received by him for the purpose of erection and keep such record open for the inspection of the engineer at any time.
- 22.4 All equipment shall be handled very carefully to prevent any damage or loss. No bare wire ropes, slings, etc. shall be used for unloading and/or handling of the equipment without the specific written permission of the engineer. The equipment stored shall be properly protected to prevent damage either to the equipment or to the floor where they are stored. The equipment from the store shall be moved to the actual location at the appropriate time so as to avoid damage of such equipment at site.
- 22.5 All electrical panels, control gear, motors and such other devices shall be properly dried by heating before they are installed and energised. Motor bearings, slip rings, commutators and other exposed parts shall be protected against moisture ingress and corrosion during storage and periodically inspected. Heavy rotating parts in assembled conditions shall be periodically rotated to prevent corrosion due to prolonged storage.
- 22.6 All the electrical equipment such as motors, generators, etc. shall be tested for insulation resistance at least once in three months from the date of receipt till the date of commissioning and a record of such measured insulation values maintained by the contractor. Such records shall be open for inspection by the engineer.
- 22.7 The contractor shall ensure that all the packing materials and protection devices used for the various equipment during transit and storage are removed before the equipment are installed.
- 22.8 The consumable and other supplies likely to deteriorate due to storage must be thoroughly protected and stored in a suitable manner to prevent damage or deterioration in quality by storage.
- 22.9 All the materials stored in the open or duty location must be covered with suitable weather-proof and flameproof covering materials wherever applicable.

- 22.10 If the materials belonging to the contractor are stored in areas other than those earmarked for him, the engineer will have the right to get it moved to the area earmarked for the contractor at the contractor's cost.
- 22.11 The contractor shall be responsible for making suitable indoor storage facilities to store all equipment which require indoor storage. Normally, all the electrical equipment such as motors, control gear, generators, exciters and consumable like electrodes, lubricants etc. shall be stored in the closed storage space. The engineer, in addition, may direct the contractor to move certain other materials which in his opinion will require indoor storage, to indoor storage areas which the contractor shall strictly comply with.

23.0 CONSTRUCTION MANAGEMENT

- 23.1 The field activities of the contractors working at site, will be co-ordinated by the engineer and the engineer's decision shall be final in resolving any disputes or conflicts between the contractor and other contractors and tradesmen of the owner regarding scheduling and co-ordination of work. Such decision by the engineer shall not be a cause for extra compensation or extension of time for the contractor.
- 23.2 The engineer shall hold weekly meetings of all the contractors working at site, at a time and a place to be designated by the engineer. The contractor shall attend such meetings and take notes of discussions during the meeting and the decisions of the engineer and shall strictly adhere to those decisions in performing his works. In addition to the above weekly meetings, the engineer may call for other meetings either with individual contractors or with selected number of contractors and in such a case the contractor, if called will also attend such meetings.
- 23.3 Time is the essence of the contract and the contractor shall be responsible for performance this works in accordance with the specified construction schedule. If at any time, the contractor is falling behind the schedule, he shall take necessary action to make good for such delays by increasing his work force or by working overtime or otherwise accelerate the progress of the work to comply with the schedule and shall communicate such actions in writing to the engineer, satisfying that his action will compensate for the delay. The contractor shall not be allowed any extra compensation for such action.
- 23.4 The engineer shall however not be responsible for provision of additional labour and/or materials or supply or any other services to the contractor except for the co-ordination work between various contractors as set out earlier.

24.0 FIELD OFFICE RECORDS

The contractor shall maintain at his site office up-to-date copies of all drawings, specifications and other contract documents and any other supplementary data complete with all the latest revisions thereto. The contractor shall also maintain in addition the continuous record of all changes to the above contract documents, drawings, specifications, supplementary data, etc. effected at the field and on completion of his total assignment under the contract shall incorporate all such changes on

the drawings and other engineering data to indicate as installed condition of the equipment furnished and erected under the contract. Such drawings and engineering data shall be submitted to the engineer in required number of copies. Daily work programme with progress of the previous day and deployment of labour related to work programme and attendance of workmen deployed during the previous day shall be maintained in a register. This register shall be signed by authorized representative of the contractor which will then be checked and signed by the owner's representative. Every three months this register shall be deposited to the owner which shall then be owners property.

25.0 CONTRACTOR'S MATERIALS BROUGHT ON TO SITE

- 25.1 The contractor shall bring to site all equipment, parts, materials, including construction equipment, tools and tackles for the purpose of the works with intimation to the engineer. All such goods shall, from the time of their being brought vest in the owner, but may be used for the purpose of the works only and shall not on any account be removed or taken away by the contractor without the written permission of the engineer. The contractor shall nevertheless be solely liable and responsible for any loss or destruction thereof and damage thereto.
- 25.2 The owner shall have a lien on such goods for any sum or sums which may at any time be due or owing to him by the contractor, under, in respect of or by reasons of the contract. After giving a fifteen (15) days' notice in writing of his intention to do so, the owner shall be at liberty to sell and dispose of any such goods, in such manner as he shall think fit including public auction or private treaty and to apply the proceeds in or towards the satisfaction of such sum or sums due as aforesaid.
- 25.3 After the completion of the works, the contractor shall remove from the site under the direction of the engineer the materials such as construction equipment, erection tools and tackles, scaffolding etc. with the written permission of the engineer. If the contractor fails to remove such materials, within fifteen (15) days of issue of a notice by the engineer to do so then the engineer shall have the liberty to dispose of such materials as detailed under clause 25.2 above and credit the proceeds thereto the account of the contractor.

26.0 PROTECTION OF PROPERTY AND CONTRACTOR'S LIABILITY

- 26.1 The contractor shall be responsible for any damage resulting from his operations. He shall also be responsible for protection of all persons including members of public and employees of the owner and the employees of other contractors and sub-contractors and all public and private property including structures, buildings, other plants and equipment and utilities either above or below the ground.
- 26.2 The contractor will ensure provision of necessary safety equipment such as barriers, sign-boards, warning lights and alarms, etc. to provide adequate protection to persons and property. The contractor shall be responsible to give reasonable notice to the engineer and the owners of public or private property and utilities when such property and utilities are likely to get damaged or injured during the performance of his works and shall make all necessary arrangements with such owners,

related to removal and/or replacement or protection of such property and utilities.

27.0 PAINTING

All exposed metal parts of the equipment including pipings, structure railing etc. wherever applicable, after installation unless otherwise surface protected, shall be first painted with at least one coat of suitable primer which matches the shop primer paint used, after thoroughly cleaning all such parts of all dirt, rust, scales, greases, oils and other foreign materials by wire brushing, scarping or sand blasting, and the same being inspected and approved by the engineer for painting. Afterwards, the above parts shall be finished with two coats of alloyed resin machinery enamel paints. The quality of the finish paint shall be as per the standards of ISI or equivalent and to be of the colour as approved by the engineer.

28.0 INSURANCE

28.1 In addition to the conditions covered under the clause entitled insurance in general terms and conditions of contract of this volume-1, the following provisions will also apply to the portion of the works to be done beyond the contractor's own or his sub-contractor's works.

28.2 Workmen's compensation insurance

This insurance shall protect the contractor against all claims applicable under the Workmen's Compensation Act 1948 (Government of India). This policy shall also cover the contractor against claims for injury, disability disease or death of his or his sub-contractor's employees, which for any reason are not covered under the Workmen's Compensation Act 1948. The liabilities shall not be less than

Workmen's compensation	As per statutory provisions
Employer's liability	As per statutory provisions

28.3 Comprehensive Automobile Insurance

This insurance shall be in such a form to protect the contractor against all claims for injuries, disability, disease and death to members of public including the owner's men and damage to the property of others arising from the use of motor vehicles during on or off the site operations, irrespective of the ownership of such vehicles.

28.4 Comprehensive General Liability Insurance

28.4.1 This insurance shall protect the contractor against all claims arising from injuries, disabilities, disease or death of members of public or damage to property of others, due to any act or omission on the part of the contractor, his agents, his employees, his representatives and sub-contractors or from riots, strikes and civil commotion. The insurance shall also cover all the liabilities of the contractor arising out of the clause entitled defense of suits under General Terms and Conditions of contracts of this Volume-I .

28.4.2 The hazards to be covered will pertain to all the works and areas where the contractor, his sub-contractors, his agents and his employees have to perform work pursuant to the contract.

28.5 The above are only illustrative list of insurance covers normally required and it will be the responsibility of the contractor to maintain all necessary insurance coverage to the extent both in time and amount to take care of all his liabilities either direct or indirect, in pursuance of the contract.

29.0 UN- FAVOURABLE WORKING CONDITIONS

The contractor shall confine all his field operations to those works which can be performed without subjecting the equipment and materials to adverse effects, during inclement weather conditions, like monsoon, storms, etc. and during other unfavorable construction conditions. No field activities shall be performed by the contractor under conditions which might adversely affect the quality and efficiency thereof, unless special precautions or measures are taken by the contractor in a proper and satisfactory manner in the performance of such works and with the concurrence of the engineer. Such unfavorable construction conditions will in no way relieve the contractor of his responsibility to perform the works as per the schedule.

30.0 PROTECTION OF MONUMENTS AND REFERENCE POINTS

The contractor shall ensure that any finds such as relic, antiquity, coins, fossils, etc. which he might come across during the course of performance of his works either during excavation or elsewhere, are properly protected and handed over to the engineer. Similarly the contractor shall ensure that the bench marks, reference points, etc., which are marked out either with the help of engineer or by the engineer shall not be disturbed in any way during the performance of his works. If any work is to be performed which disturb such references, the same shall be done only after these are transferred to other suitable locations under the direction of the engineer. The contractor shall provide all necessary materials and assistance for such relocation of reference points etc.

31.0 WORK AND SAFETY REGULATIONS

31.1 The contractor shall ensure proper safety of all the workmen, materials plant and equipment belonging to him or the Company or to others, working at or near the site. The contractor shall also be responsible for provision of all safety notices and safety equipment required both by the relevant legislation and the engineer-in-charge as he may deem necessary.

31.2 The contractor will notify well in advance to the engineer-in-charge of his intention to bring to the site any container filled with liquid or gaseous fuel or explosive or petroleum substance or such chemicals which may involve hazards. The engineer-in-charge shall have the right to prescribe the conditions, under which such container is to be stored, handled and used during the performance of the works and the contractor shall strictly adhere to and comply with such instructions. The engineer-in-charge shall have the right at his sole discretion to inspect any such container or such construction plant/equipment for which material in the container is required to be used and if in his opinion, its use is not safe, he may forbid its' use. No claim due to such prohibition shall be entertained by the owner. Nor the owner shall entertain any claim of the contractor towards

additional safety provisions/conditions to be provided for constructed as per engineer-in-charge's instructions.

Further any such decision of engineer-in-charge shall not, in any way, absolve the contractor of his responsibilities, and in case, use of such a container or entry thereof into the site area is forbidden by engineer-in-charge, the contractor shall use alternative methods with the approval of engineer-in-charge without any cost implication to Company or extension of work schedule.

- 31.3 Where it is necessary to provide and/or store petroleum products or petroleum mixtures and explosives, the contractor shall be responsible for carrying out such provision and/or storage in accordance with the rules and regulations laid down in Petroleum Act 1934, Explosives Act 1948, and Petroleum and Carbide of Calcium Manual Published by the Chief Inspector of Explosives of India. All such storage shall have prior approval of the engineer-in-charge. In case, any approvals are necessary from the Chief Inspector (Explosive) or any statutory authorities, the contractor shall be responsible for obtaining the same.
- 31.4 All equipment used in construction and erection by contractor shall meet Indian, Inter-national Standards and where such standards do not exist, the contractor shall ensure these to be absolutely safe. All equipment shall be strictly operated and maintained by the contractor in accordance with manufacturer's operation manual and safety instructions and as per Guidelines/Rules of the Company in this regard.
- 31.5 Periodical Examinations and all tests for all lifting/hoisting equipment and tackles shall be carried out in accordance with the relevant provisions of Factories Act 1948, Indian Electricity Act 1910 and associated Laws/Rules/Acts enforced from time to time. A register of such examinations and tests shall be properly maintained by the contractor and will be promptly produced as and when desired by engineer-in-charge or by the person authorised by him.
- 31.6 The contractor shall be fully responsible for the safe storage of his and his sub-contractors radioactive sources in accordance with BARC/DAE Rules and other applicable provisions. All precautionary measures stipulated by BARC/DAE in connection with use, storage and handling of such material will be taken by contractor.
- 31.7 The contractor shall provide suitable safety equipment of prescribed standard to all employees and workmen according to the need, as may be directed by engineer-in-charge who will also have right to examine these safety equipment to determine their suitability, reliability, acceptability and adaptability.
- 31.8 Where explosives are to be used, the same shall be used under the direct control and supervision of an expert, experienced, qualified and competent person strictly in accordance with the code practices/rules framed under Indian Explosives Act pertaining to handling, storage and use of the explosives.

- 31.9 The contractor shall provide safe working conditions to all workmen and employees at the site including safe means of access, railings, stairs, ladders, scaffoldings etc. The scaffoldings, stairs, ladders etc. shall be erected under the control and supervision of an experienced and competent person. For erection, good and standard quality of material only shall be used by the contractor.
- 31.10 The contractor shall not interfere or disturb electric fuses, wiring and other electrical equipment belonging to the owner or other contractors under any circumstances, whatsoever, unless expressly permitted in writing by the Company to handle such fuses, wiring or electrical equipment.
- 31.11 Before the contractor connects any electrical appliances to any plug or socket belonging to the other contractor or owner, he shall:
- a) satisfy the engineer that the appliances are in good working condition.
 - b) inform the engineer of the maximum current rating, voltage and phases of the appliances.
 - c) obtain permission of the engineer detailing the sockets to which the appliances may be connected.
- 31.12 The engineer will not grant permission to connect until he is satisfied that:
- a) the appliance is in good condition and is fitted with a suitable plug.
 - b) the appliance is fitted with a suitable cable having two earth conductors, one of which shall be an earthed metal sheath surrounding the cores.
- 31.13 No electric cable in use by the contractor/owner will be disturbed without prior permission. No weight of any description will be imposed on any cable and no ladder or similar equipment will rest against or attached to it.
- 31.14 No repair work shall be carried out on any live equipment. The equipment shall must be declared safe by engineer-in-charge and a permit to work shall be issued by engineer-in-charge before any repair work is carried out by the contractor. While working on electric lines/equipments whether alive or dead, suitable type and sufficient quantity of tools will have to be provided by contractor to electricians/workmen/officers.
- 31.15 The contractor shall employ necessary number of qualified, full time electricians/ electrical supervisors to maintain in his temporary electrical installations.
- 31.16 The contractor employing more than 250 workmen whether temporary, casual, probationer, regular or permanent or on contract, shall employ at least one full time officer exclusively as safety officer to supervise safety aspects of the equipment and workmen who will co-ordinate with the project safety officer. In case of work being carried out through sub-contractor's, the sub-contractor's workmen/employees will also be considered as the contractor's employees/workmen for above purpose. The name and address of such safety officer of contractor will be promptly informed in writing to engineer-in-charge with a copy to safety officer-in charge before he starts work or immediately after any change of the incumbent is made during currency of the contract.

- 31.17 In case any accident occurs during the construction/erection or other associated activities undertaken by the contractor thereby causing any minor or major or fatal injury to his employees due to any reason, whatsoever, it shall be the responsibility of the contractor to promptly inform the same to the company's engineer-in-charge in prescribed form and also to all the authorities envisaged under the applicable laws.
- 31.18 The engineer-in-charge shall have the right at his sole discretion to stop the work, if in his opinion the work is being carried out in such a way that it may cause accidents and endanger the safety of the persons and/or property, and/or equipment. In such cases, the contractor shall be informed in writing about the nature of hazards and possible injury/accident and he shall comply to remove short comings promptly. The contractor after stopping the specific work, can, if felt necessary, appeal against the order of stoppage of work to the General Manager of the project within 3 days of such stoppage of work and decision of the project G.M in this respect shall be conclusive and binding on the contractor.
- 31.19 The contractor shall not be entitled for any damages/compensation for stoppage of work due to safety reasons as provided in para 31.18 above and the period of such stoppage of work will not be taken as an extension of time for completion of work and will not be the ground for waiver of levy of liquidated damages.
- 31.20 The contractor shall follow and comply with all the Company safety rules relevant provisions of applicable laws pertaining to the safety of workmen, employees, plant and equipment as may be prescribed from time to time without demur, protest or content or reservation. In case of any inconformity between statutory requirement and the Company safety rules referred above, the latter shall be binding on the contractor unless the statutory provisions are more stringent.
- 31.21 If the contractor fails in providing safe working environment as per the Company safety rules or continues the work even after being instructed to stop work by engineer-in-charge as provided in para 31.18 above, the contractor shall promptly pay to the Company, on demand i.e. by the owner compensation at the rate of Rs. 5,000/- per day or part there of till the instructions are complied with and so certified by engineer-in-charge. However in case of accident taking place causing injury to any individual, the provisions contained in para 31.22 shall also apply in addition to compensation mentioned in this para.
- 31.22 If the contractor does not take all safety precautions and/or fails to comply with the safety rules as prescribed by the Company or under the applicable laws for the safety of the equipment and plant and for the safety of personnel and the contractor does not prevent hazardous conditions which cause injury to his own employees or employees of other contractors, or the Company employees or any other person who are at site or adjacent thereto, the contractor shall be responsible for payment of compensation under the relevant provisions of the workmen's compensation act and rules framed thereunder or any other applicable laws as applicable from time to time.

Permanent disablement shall have same meaning as indicated in workmen's compensation act. The compensation mentioned above shall be in addition to the compensation payable to the workmen/employees under the relevant provisions of the workmen's compensation act and rules framed there under or any other applicable laws as applicable from time to time.

In case the owner is made to pay such compensation then the contractor is liable to reimburse the owner such amount.

32.0 CODE REQUIREMENTS

The erection requirements and procedures to be followed during the installation of the equipment shall be in accordance with the relevant Indian standards codes of practices or in their absence appropriate International standards, Indian Boiler Regulations. ASME codes and accepted good engineering practice, the engineer's drawings and other applicable Indian recognized codes and the laws and regulations of the Government of India.

33.0 FOUNDATION, DRESSING AND GROUTING

33.1 The surfaces of foundations shall be dressed to bring the top surface of the foundations to the required level, prior to placement of equipment/equipment bases on the foundations.

33.2 All the equipment bases and structural steel base plates shall be grouted and finished as per these specifications unless otherwise recommended by the equipment manufacturer.

33.3 The concrete foundation surfaces shall be properly prepared by chipping, grinding as required to bring the type of such foundation to the required level, to provide the necessary roughness for bondage and to assure enough bearing strength. All laitance and surface film shall be removed and cleaned.

33.4 GROUTING MIX

The grouting mixtures shall be composed of Portland cement, sand and water. The Portland cement to be used shall conform to ISI No. 269 or equivalent, sand shall conform to ISI No.383/2386 or equivalent. The grout proportions for flat based where the grouting space does not exceed 35 mm shall be 50 Kg bag of cement to 75 Kg of sand. Only the required quantity of water shall be added so as to make the mix quaky and flowable and the mix shall not show excess water on top when it is being puddled in place. For thicker grout beds upto 65 mm, the amount of sand shall be increased to 105 Kg per bag of cement. Bases which are hollow and are to be filled full of grouting shall be filled to a level of 25 mm above the outside rim with a mortar mix in the volumetric proportions of one bag of cement and 1.5 bags sand and 1.5 part 6 mm granite gravel. An acceptable plasticiser may be added to the grout mixes in a proportion recommended by the plasticisers manufacturer. All such grouts shall be thoroughly mixed for not less than five minutes in an approved mechanical mixer and shall be used immediately after mixing.

33.5 PLACING OF GROUT

33.5.1 After the base has been prepared, its alignment and level has been checked and approved and before actually placing the grout a low dam shall be set around the base at a distance that will permit pouring and manipulation of the grout. The height of such dam shall be at least 25 mm above the bottom of the base. Suitable size and number of chains shall be introduced under the base before placing the grout, so that such chains can be moved back and forth to push the grout into every part of the space under the base.

33.5.2 The grout shall be poured either through grout holes if provided or shall be poured at one side or at two adjacent sides giving it a pressure head to make the grout move in a solid mass under the base and out in the opposite side. Pouring shall be continued until the entire space below the base is thoroughly filled and the grout stands at least 25 mm higher all around than the bottom of the base. Enough care should be taken to avoid any air or water pockets beneath the bases.

33.6 FINISHING OF THE EDGES OF THE GROUT

The poured grout should be allowed to stand undisturbed until it is well set. Immediately thereafter, the dam shall be removed and grout which extends beyond the edges of the structural or equipment base plates shall be cut off flush and removed. The edges of the grout shall then be pointed and finished with 1:2 cement mortar pressed firmly to bond with the body of the grout and smoothed with a tool to present a smooth vertical surface. The work shall be done in a clean and scientific manner and the adjacent floor spaces, exposed edges of the foundations, and structural steel and equipment base plates shall be thoroughly cleaned of any spillage of the grout.

33.7 CHECKING OF EQUIPMENT AFTER GROUTING

After the grout is set and cured, the contractor shall check and verify the alignment of equipment, alignment of shafts of rotating machinery, the slopes of all bearing pedestals, centering of rotors with respect to their sealing bores, couplings, etc. as applicable and the like items to ensure that no displacement had taken place during grouting. The values recorded prior to grouting shall be used during such post grouting check-up and verifications. Such pre and post grout records of alignment details shall be maintained by the contractor in a manner acceptable to the engineer.

34.0 SHAFT ALIGNMENTS

All the shafts of rotating equipment shall be properly aligned to those of the matching equipment to as perfect an accuracy as practicable. The equipment shall be free from excessive vibration so as to avoid over-heating of bearings or other conditions which may tend to shorten the life of the equipment. All bearings, shafts and other rotating parts shall be thoroughly cleaned and suitably lubricated before starting. All alignment should be checked through alignment checker or condition monitoring equipment in the presence of the engineer-in-charge.

35.0 DOWELING

All the motors and other equipment shall be suitably doweled after alignment of shafts with tapered machined dowels as per the direction of the engineer.

36.0 CHECK OUT OF CONTROL SYSTEMS / POWER SUPPLY

After completion of wiring, cabling furnished under separate specifications and laid and terminated by the owner, the contractor shall check out the operation of all control systems for the equipment furnished and installed under these specifications and documents. The contractor shall get the drawings pertaining to the control system, power supply etc. approved from Directorate General of Mine Safety (DGMS) or any other appropriate authority as necessary, wherever required as per the rules and regulations of the of Indian Mines Act governed by D.G.M.S.

37.0 COMMISSIONING SPARES

The contractor shall make arrangements for an adequate inventory at site of necessary commissioning spares prior to commissioning of the equipment furnished and erected so that any damage or loss during this commissioning activities necessitating the requirements of spares will not come in the way of timely completion of the works under the contract.

38.0 CABLING

38.1 All cables shall be supported by conduits or cable tray run in air or in cable channels. These shall be installed in exposed runs parallel or perpendicular to dominant surfaces with right angle turn made of symmetrical bends or fittings. When cables are run on cable trays, they shall be clamped at a minimum interval of 2000 mm or otherwise as directed by the engineer.

38.2 Each cable, whether power or control, shall be provided with a metallic or plastic of an approved type, bearing a cable reference number indicated in the cable and conduit list (prepared by the contractor), at every 5 meter run or part thereof and at both ends or the cable adjacent to the terminations. Cable routing is to be done in such a way that cables are accessible for any maintenance and for easy identification.

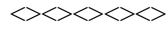
38.3 Sharp bending and kinking of cables shall be avoided. The minimum radii for PVC insulated cables 1100 V grade shall be $15D$, where D is the overall diameter of the cable. Installation of other cables like high voltage, coaxial, screened, compensating, mineral insulated shall be in accordance with the cable manufacturer's recommendations. Wherever cables cross roads and water, oil, sewage or gas lines, special care should be taken for the protection of the cables in designing the cable channels.

38.4 In each cable run some extra length shall be kept at a suitable point to enable one to two straight through joints to be made should the cable develop fault at a later date.

38.5 Control cable terminations shall be made in accordance with wiring diagrams, using identifying codes subject to engineer's approval. Multicore control cable jackets shall be removed as required to train and terminate the conductors. The cable jacket shall be left on the cable, as far as possible, to the point of the first conductor branch. The insulated conductors from which the jacket is removed shall be neatly twined in bundles and terminated. The bundles shall be firmly but not tightly tied

utilising plastic or nylon ties or specially treated fungus protected cord made for this purpose. Control cable conductor insulation shall be securely and evenly cut.

- 38.6 The connectors for control cables shall be covered with a transparent insulating sleeve so as to prevent accidental contact with ground or adjacent terminals and shall preferably terminate Elmex terminals and washers. The insulating sleeve shall be fire resistant and shall be long enough to overpass the conductor insulation. All control cables shall be fanned out and connection made to terminal blocks and test equipment for proper operation before cables are corded together.



**PROFORMA FOR BANK GUARANTEE FOR BID SECURITY, PERFORMANCE BG,
AGREEMENT, AFFIDAVIT, DECLARATION ETC**

(ANNEXURE – A TO N)

FORMAT OF “LETTER OF BID”

PROFORMA FOR CONTRACTOR'S BID AND ACCEPTANCE OF BID CONDITIONS
(ON THE LETTER HEAD OF THE BIDDERAS ENROLLED ONLINE ON e - TENDERING PORTAL OF BCCL)

To:
The GM (CMC),
Contract Management Cell,
Level-V, Koyla Bhawan,
BCCL Dhanbad (Jh)
Pin Code - 826 005

Sub: Letter of BID for the Work

Ref: 1. NIT No

2.Tender Id. No.

Dear Sir,

This has reference to above referred tender. I/we have read and examined the conditions of contract, scope of work, technical specifications, BOQ and other documents carefully as available in website mentioned in NIT.

I /We am/are pleased to submit our bid for the above work. I/We hereby unconditionally accept the tender conditions and tender documents in its entirety for the above work and agree to abide by and fulfill all terms and conditions and specifications as contained in the bid document.

I/we here by submit all the documents as required to meet the eligibility criteria as per provision of the bid notice/document.

I/We hereby confirm that this bid complies with the Bid validity, Bid security and other documents as required by the Bidding documents.

If any information furnished by me/us towards eligibility criteria of this tender is found to be incorrect at any time, penal action as deemed fit may be taken against me/us for which I/We shall have no claim against BCCL.

Until a formal agreement is prepared and executed, this bid and your subsequent Letter of Acceptance/Work Order shall constitute a binding contract between us and BCCL.

Should this bid be accepted, I / we agree to furnish Performance Security within 30 days of receipt of letter of acceptance and commence the work within 30 days of issue of letter of acceptance or within 7 (seven) days of handing over the site of work whichever is later. In case of our failure to abide by the said provision BCCL shall, without prejudice to any other right or remedy, be at liberty to cancel the letter of acceptance/ award and to forfeit the Earnest Money and also debar us from participating future tenders for a minimum period of 12 months.

(This document is digitally signed by the DSC holder authorised by the bidder and therefore no physical signature is required)

DECLARATION

(On the letter head of the Bidders as enrolled online on e-tendering portal of BCCL)

I/We confirm that my/our offer is as per Technical Specifications for Mechanical, Electrical & Civil works provided in NIT/Tender Document and my/our offer is unconditional.

(This document is digitally signed by the DSC holder authorised by the bidder and therefore no physical signature is required)

PROFORMA FOR UNDERTAKING TO BE SUBMITTED BY BIDDER(S)
FOR COMMITMENT, GENUINENESS OF THE INFORMATION FURNISHED ONLINE AND
AUTHENTICITY OF THE DOCUMENTS UPLOADED ONLINE IN SUPPORT OF HIS ELIGIBILITY

FORMAT OF UNDERTAKING

I / We,, Proprietor/Partner/Legal Attorney/Director/
Accredited Representative of M/S., solemnly declare that:

1. I/We am/are submitting Bid for the workagainst NIT No/Tender ID..... Dated..... and I/we offer to execute the work in accordance with all the terms, conditions and provisions of the bid.
2. Myself/ Our Partners/Directors don't has/have any relative as employee of Bharat Coking Coal Limited.
3. All information furnished by us in respect of fulfillment of eligibility criteria and qualification information of this Bid is complete, correct and true.
4. All copy of documents, credentials and documents submitted along with this Bid are genuine, authentic, true and valid.
5. I/ We hereby authorize department to seek references / clarifications from our Bankers.
6. Deleted.
7. We hereby undertake that we shall register and obtain license from the competent authority under the contract labour (Regulation & Abolition Act) as relevant, if applicable.
8. * I/We hereby confirm that we have registration with CMPF / EPF Authorities. We shall make necessary payments as required under law.

Or

- * I/We hereby undertake that we shall take appropriate steps for registration as relevant under CMPF / EPF authorities, if applicable. We shall make necessary payments as required under law.
9. * I/We have not been banned or delisted by any Govt., or Quasi Govt. Agencies or PSUs(In case of JOINT VENTURE, all partners are covered).

Or

- * I / Wehave been banned by the organization named “_____” for a period of..... year/s, effective from to.....(in case of JOINT VENTURE, name(s) of the JOINT VENTURE Partner(s)).
10. I/We have submitted only one bid as per provision of clause no. 4.1 of ITB of Tender document.

11. I/We hereby confirm that the work experience indicated by me/us is for similar nature of work as defined in clause no. 6(A) of NIT.
12. I/We hereby confirm that the work experience & resources indicated by me/us does not include the work experience & resources of the sub-contractor as per requirement of point no. 1 of Note under clause no. 6(A) of NIT.
13. If any information and document submitted is found to be false/ incorrect at any time, department may cancel my/our Bid and action as deemed fit may be taken against me/us, including termination of the contract, forfeiture of all dues including Earnest Money and banning/ delisting of our firm and all partners of the firm etc.
14. I / we (including all members of JOINT VENTURE& sub-contractors) are not associated, nor has been associated in the past, directly or indirectly with the consultant or any other entity that has prepared the design, specification and other documents for the project or being proposed as engineer for the contract.

* Delete whichever is not applicable.

(This document is digitally signed by the DSC holder authorised by the bidder and therefore no physical signature is required)

PROFORMA OF MANDATE FORM FOR ELECTRONIC MODE PAYMENT

PROFORMA FOR COLLECTING PAYMENT THROUGH ELECTRONIC MODE INCLUDING ELECTRONIC FUND TRANSFER (EFT) & ELECTRONIC CLEARING SYSTEM (ECS)

1	VENDOR/SUPPLIER/CONTRCTOR/CUSTOMER'S NAME & ADDRESS (With Telephone No and Fax)	
2	Permanent Account No.	
3	PARTICULARS OF BANK ACCOUNT	
	A) BANK NAME	
	B) (i) BRANCH NAME (including RTGS code and IFSC code)	
	(ii) ADDRESS	
	(iii) TELEPHONE NO & FAX NO.	
	C) 9 – DIGIT CODE NUMBER OF THE BANK AND BRANCH (appearing on the MICR cheque issued on the bank) OR 5 – DIGIT CODE NO OF SBI	
	D) ACCOUNT TYPE (S.B.Account/Current Account OR Cash Credit with code 10/11/13)	
	E) LEDGER NO/LEDGER FOLIO NO.	
	F) ACCOUNT NUMBER (Core Banking) & Style of Account (As appearing in the cheque Book)	
4	DATE OF EFFECT	

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 institution responsible. I have read the option invitation letter and agree to discharge responsibility expected of me as a participant under the scheme. Any Bank charges levied by the Bank of such e- Transfer shall be borne by us.

Date:

()
Signature of the **CUSTOMER/ VENDOR/
SUPPLIER/CONTRCTOR**

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

()
Signature of the **AUTHORIZED OFFICIALS FROM THE BANK**

FORMAT FOR CONTRACT AGREEMENT

(On Non- Judicial Stamp Paper)

Agreement No.

Dated:

THIS ARTICLE OF AGREEMENT made on this _____ day of _____ 201_ between the Bharat Coking Coal Limited, a Employer registered under the Indian Companies Act. 1956 with its registered office at Dhanbad and a Subsidiary of Coal India Limited, Govt. of India Undertaking, P.O. BCCL Township (Pin-826005) Dist. : Dhanbad (Jharkhand), (hereinafter referred to as the Employer which expression where the context so admit shall include its successors in interest and assign) of the one Part and _____ (hereinafter referred to as "the Contractor" which expression where the context so admit shall include its heirs, executors, administrators legal representatives, successors in business and assign) of the other part.

WHEREAS, the Employer invited bid for the Work “_____” and the bid of the Contractor has been accepted by the Employer vide their Letter No _____ dt. _____ for a sum of _____ [Contract sum in figure & words]

WHEREAS the Contractor has agreed to execute the works on the terms & conditions as stipulated in the Bid and subsequent amendments thereto for a sum of _____ [Contract sum in figure & words] for successful completion of the work.

NOW THIS AGREEMENT WITNESSES AND IT IS HEREBY AGREED AS FOLLOWS:

1. In pursuance of the Agreement aforesaid and in consideration for the payment of the sum of _____ [Contract sum in figure & words] and/or such sum as may be payable to the contractor, the Contractor shall upon and subject to the said terms & conditions execute and complete the work shown upon in the said drawings and described in the said scope of work as provided for in the said conditions.
2. The time shall be considered as one of the essence of the contract and time for completion of the contract shall be months from the date of commencement of work.
3. The parties hereto shall respectively and faithfully abide by and submit themselves to the terms & conditions and stipulations contained in this agreement and perform and discharge their part of contract accordingly.
4. This final Agreement has been arrived at between the parties after due consideration of the correspondences, documents, meetings and negotiations held from time to time. The following documents shall constitute the Contract between the Employer and the Contractor. And each shall be read and construed as an integral part of the Contract

Part Description of Documents

01. Article of Agreement.
02. Detailed Bid Notice.
03. Notification of Award
04. The Bid and Prices Schedules submitted by the Contractor

- 05. Conditions of Contract
- 06. Financial terms and conditions
- 07. Billing Schedule
- 08. Technical Specifications and drawings
- 09. Any Other Documents

5. The Contract shall be executed within the purview of the Indian Laws.

In witness whereof the parties hereto have hereunder affixed their signatures at Dhanbad on the day, month and year written as above.

SIGNED, SEALED AND DELIVERED

Signed on behalf of the Contractor

Signed on behalf of the Employer

Designation

Designation

Bharat Coking Coal Ltd.,
Koyla Bhawan, P.O-BCCL Township
Koylanagar
Dist. : Dhanbad-826005 (Jharkhand)

In the presence of

WITNESS - 1
(Signature)
(Name in Block Letters)

Official Address:

WITNESS - 1
(Signature)
(Name in Block Letters)

Official Address:

WITNESS - 2
(Signature)
(Name in Block Letters)

Official Address:

WITNESS - 2
(Signature)
(Name in Block Letters)

Official Address:

Deleted

PROFORMA OF BANK GUARANTEE FOR PERFORMANCE

To,

Re: Bank Guarantee in respect of contract No-----

Dated-----between -----(Name of the company)

And----- (Name of the contractor).

M/s ----- (Name and address of the contractor)(herein after called "the contractor") has entered into a contract dated -----(herein after called the said contract) with M/s ----- (Name of the company) (hereinafter called "the company") to execute -----(name of the contract and brief description of work) on the terms and conditions contained in the said contract.

It has been agreed that contractor shall furnish the Bank guarantee from a Nationalised / Scheduled Bank for a sum of `----- as security for due compliance and performance of the terms and conditions of the said contract.

The----- (name of the Bank) having its office at _____ has at the request of the contractor agreed to give the Guarantee hereinafter contained.

We, the----- Bank (hereinafter called "the Bank") do hereby unconditionally agree with the company that if the contractor shall in any way fail to observe or perform the terms and conditions of the said contract or shall commit any breach of its obligation there under, the Bank shall on demand and without any objection or demur pay to the company the said sum of `-----or such portion as shall then remain due with interest without requiring the company to have recourse to any legal remedy that may be available to it to compel the Bank to pay the sum , or calling on the company to compel such payment by the contractor.

Any such demand shall be conclusive as regards the liability of the contractor to the company and as regards the amount payable by the Bank under this Guarantee. The Bank Shall not be entitled to withhold payment on the ground that the contractor has disputed its liability to pay or has disputed the quantum of the amount or that any arbitration proceeding or legal proceeding is pending between the company and the contractor regarding the claim.

We, the ----- Bank further agree that the Guarantee shall come into force from the date hereof and shall remain in force and effect till the period that will be taken for the performance of the said contract which is likely to be----- day of ----- but if the period of contract is extended either pursuant to the provisions in the said contract or by mutual agreement between the contractor and the company the Bank shall renew the period of the Bank Guarantee failing which it shall pay to the company the said sum of Rs.--- ----- or such lesser amount of the said sum of `----- as may be due to the company and as the company may demand. The Guarantee shall remain in force until the dues of the company in respect of the said sum of Rs.----- and interest are fully satisfied and the company certifies that the contract has been fully carried out by the contractor and discharged the guarantee.

The Bank further agrees with the company that the company shall have the fullest liberty without consent of the Bank and without affecting in any way the obligations hereunder to vary any of the terms and conditions of the said contract or to extend time for performance of the said contract from time to time or to postpone for any time or from time to time any of the powers exercisable by the company against the contractor and to forbear to enforce any of the terms and conditions relating to the said contract and the Bank shall not be relieved from its liability by reason of such failure or extension being granted to the contractor or to any forbearance, act or omissions on the part of the company or any indulgence by the company to the contractor or any other matter or thing whatsoever which under the law relating to sureties would but for this provision have the effect of relieving or discharging the Guarantor.

The Bank further agrees that in case this guarantee is required for a longer period and it is not extended by the Bank beyond the period specified above, the Bank shall pay to the company the said sum of ` ----- -- or such lesser sum as may then be due to the company and as the company may require.

Notwithstanding anything contained herein the liability of the Bank under this Guarantee is restricted to `--- ----- the guarantee shall remain in force till the day ----- of ----- and unless the Guarantee is renewed or claim is preferred against the Bank within six months from the said date all rights of the

company under this Guarantee shall cease and the Bank shall be relieved and discharged from all liabilities hereunder except as provided in the preceding clause.

The Guarantee will not be discharged due to the change in the constitution of the Bank or the contractor. The Bank has under its constitution power to give this Guarantee and Shri----- who has signed it on behalf of the Bank has authority to do so.

“The Bank Guarantee as referred above shall be payable at Kolkata Branch/Dhanbad Branch at.....(pl. specify name of Branch with address)”

Dated this----- day of ----- 20--

Signature of the authorised Person.

For and on behalf of the Bank.

Place:

Under Jurisdiction of Dhanbad Court only.

INTEGRITY PACT

Between

BHARAT COKING COAL LIMITED(BCCL) hereinafter referred to as “The Principal”

And

.....hereinafter referred to as “The Bidder/Contract”

Preamble

The Principal intends to award, under laid down organizational procedures, contract/s for -----
------. The Principal values full compliance with all relevant laws and regulations, and the principles of economic use of resources, and of fairness and transparency in its relations with its Bidder/s and Contractor/s.

In order to achieve these goals, the Principal cooperates with the renowned international Non-Governmental Organisation “Transparency International” (TI). Following TI’s national and international experience, the Principal will appoint an external independent Monitor who will monitor the tender process and the execution of the contract for compliance with the principles mentioned above.

Section 1 – Commitments of the Principal

The Principal commits itself to take all measures necessary to prevent corruption and to observe the following principles:-

No employee of the Principal, personally or through family members, will in connection with the tender for, or the execution of a contract, demand, take a promise for or accept, for him/herself or third person, any material or immaterial benefit which he/she is not legally entitled to.

The Principal will, during the tender process treat all Bidders with equity and reason. The Principal will in particular, before and during the tender process, provide to all Bidders the same information and will not provide to any Bidder confidential/additional information through which the Bidder could obtain an advantage in relation to the tender process or the contract execution.

The Principal will exclude from the process all known prejudiced persons.

If the Principal obtains information on the conduct of any of its employees which is a criminal offence under the relevant Anti-Corruption Laws of India, or if there be a substantive suspicion in this regard, the Principal will inform its Vigilance Office and in addition can initiate disciplinary actions.

Section 2 – Commitments of the Bidder/Contractor

- (1) The Bidder/Contractor commits itself to take all measures necessary to prevent corruption. He commits himself to observe the following principles during his participation in the tender process and during the contract execution.

The Bidder/Contractor will not, directly or through any other person or firm, offer, promise or give to any of the Principal’s employees involved in the tender process or the execution of the contract or to any third person any material or immaterial benefit which he/she is not legally entitled to, in order to obtain in exchange any advantage of any kind whatsoever during the tender process or during the execution of the contract.

The Bidder/Contractor will not enter with other Bidders into any undisclosed agreement or understanding, whether formal or informal. This applies in particular to prices, specifications, certifications, subsidiary contracts, submission or non-submission of bids or any other actions to restrict competitiveness or to introduce cartelization in the bidding process.

The Bidder/Contractor will not commit any offence under the relevant Anti-corruption Laws of India; further the Bidder/Contractor will not use improperly, for purposes of competition or personal gain, or pass on to others, any information or document provided by the Principal as part of the business relationship, regarding plans, technical proposals and business details, including information contained or transmitted electronically.

The Bidder/Contractor will, when presenting his bid, disclose any and all payments he has made, is committed to or intends to make to agents, brokers or any other intermediaries in connection with the award of the contract.

- (2) The Bidder/Contractor will not instigate third persons to commit offences outlined above or be an accessory to such offences.
- (3) The Bidder/Contractor signing the IP (Integrity Pact) shall not approach the courts while representing the matters to IEMs and he / she will await their decision in the matter.

Section 3 – Disqualification from tender process and exclusion from future contracts

If the Bidder, before contract award has committed a transgression through a violation of Section 2 or in any other form such as to put his reliability or credibility as Bidder into question, the Principal is entitled to disqualify the Bidder from the tender process or to terminate the contract, if already signed, for such reason.

1. If the Bidder/Contractor has committed a transgression through a violation of Section 2 such as to put his reliability or credibility into question, the Principal is entitled also to exclude the Bidder/Contractor from future contract award processes. The imposition and duration of the exclusion will be determined by the severity of the transgression. The severity will be determined by the circumstances of the case, in particular the number of transgressions, the position of the transgressions within the company hierarchy of the Bidder and the amount of the damage. The exclusion will be imposed for a minimum of 6 months and maximum of 3 years.
2. The Bidder accepts and undertakes to respect and uphold the Principal's absolute right to resort to and impose such exclusion and further accepts and undertakes not to challenge or question such exclusion on any ground, including the lack of any hearing before the decision to resort to such exclusion is taken. This undertaking is given freely and after obtaining independent legal advice.
3. If the Bidder/Contractor can prove that he has restored/recouped the damage caused by him and has installed a suitable corruption prevention system, the Principal may revoke the exclusion prematurely.
4. A transgression is considered to have occurred if in light of available evidence no reasonable doubt is possible.

Section 4 – Compensation for Damages

1. If the Principal has disqualified the Bidder from the tender process prior to the award according to Section 3, the Principal is entitled to demand and recover from the Bidder liquidated damages equivalent to 3 % of the value of the offer or the amount equivalent to Earnest Money Deposit/Bid Security, whichever is higher.
2. If the Principal has terminated the contract according to Section 3, or if the Principal is entitled to terminate the contract according to section 3, the Principal shall be entitled to demand and recover from the Contractor liquidated damages equivalent to 5% of the contract value or the amount equivalent to Security Deposit/Performance Bank Guarantee, whichever is higher.
3. The bidder agrees and undertakes to pay the said amounts without protest or demur subject only to condition that if the Bidder/Contractor can prove and establish that the exclusion of the Bidder from the tender process or the termination of the contract after the contract award has caused no damage

or less damage than the amount or the liquidated damages, the Bidder/Contractor shall compensate the Principal only to the extent of the damage in the amount proved.

Section 5 – Previous transgression

1. The Bidder declares that no previous transgression occurred in the last 3 years with any other Company in any country conforming to the TI approach or with any other Public Sector Enterprise in India that could justify his exclusion from the tender process.
2. If the Bidder makes incorrect statement on this subject, he can be disqualified from the tender process or the contract, if already awarded, can be terminated for such reason.

Section 6 – Equal treatment of all Bidders/Contractor/Subcontractors

1. The Bidder/Contractor undertakes to demand from all subcontractors a commitment in conformity with this Integrity Pact, and to submit it to the Principal before contract signing.
2. The Principal will enter into agreements with identical conditions as this one with all Bidders, Contractors and Subcontractors.
3. The Principal will disqualify from the tender process all bidders who do not sign this Pact or violate its provisions.

Section 7 – Criminal charges against violating Bidders/Contractors/Subcontractors

If the Principal obtains knowledge of conduct of a Bidder, Contractor or Subcontractor, or of an employee or a representative or an associate of a Bidder, Contractor or Subcontractor, which constitutes corruption, or if the Principal has substantive suspicion in this regard, the Principal will inform the Vigilance Office.

Section 8 – External Independent Monitor/Monitors (three in number depending on the size of the contract)(to be decided by the Chairperson of the Principal)

1. The Principal appoints competent and credible external independent Monitor for this Pact. The task of the Monitor is to review independently and objectively, whether and to what extent the parties comply with the obligations under this agreement.
2. The Monitor is not subject to instructions by the representatives of the parties and performs his functions neutrally and independently. He reports to the Chairperson of the Board of the Principal.
3. The Contractor accepts that the Monitor has the right to access without restriction to all Project documentation of the Principal including that provided by the Contractor. The Contractor will also grant the Monitor, upon his request and demonstration of a valid interest, unrestricted and unconditional access to his project documentation. The same is applicable to Subcontractors. The Monitor is under contractual obligation to treat the information and documents of the Bidder/Contractor/ Subcontractor with confidentiality.
4. The Principal 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 Principal and the Contractor. The parties offer to the Monitor the option to participate in such meetings.
5. As soon as the Monitor notices, or believes to notice, a violation of this agreement, he will so inform the Management of the Principal and request the Management to discontinue or heal the violation, 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.
6. The Monitor will submit a written report to the Chairperson of the Board of the Principal within 8 to 10 weeks from the date of reference or intimation to him by the 'Principal' and, should the occasion arise, submit proposals for correcting problematic situations.
7. Monitor shall be entitled to compensation on the same terms as being extended to/provided to Outside Expert Committee members/Chairman as prevailing with Principal.

8. If the Monitor has reported to the Chairperson of the Board a substantiated suspicion of an offence under relevant Anti-Corruption Laws of India, and the Chairperson has not, within reasonable time, taken visible action to proceed against such offence or reported it to the Vigilance Office, the Monitor may also transmit this information directly to the Central Vigilance Commissioner, Government of India.
9. The word 'Monitor' would include both singular and plural.

Section 9 – Pact Duration

This Pact begins when both parties have legally signed it. It expires for the Contractor 12 months after the last payment under the respective contract, and for all other Bidders 6 months after the contract has been awarded.

If any claim is made/ lodged during this time, the same shall be binding and continue to be valid despite the lapse of this pact as specified above, unless it is discharged/determined by Chairperson of the Principal.

Section 10 – Other provisions

1. This agreement is subject to Indian Law. Place of performance and jurisdiction is the Registered Office of the Principal, i.e. New Delhi.
2. Changes and supplements as well as termination notices need to be made in writing. Side agreements have not been made.
3. If the Contractor is a partnership or a Joint Venture, this agreement must be, signed by all partners or Joint Venture members.
4. Should one or several provisions of this agreement turn out to be invalid, the remainder of this agreement remains valid. In this case, the parties will strive to come to an agreement to their original intentions.

 For the Principal
 Place.....

 For the Bidder/Contractor
 Witness1:

Date

Witness2:

TECHNICAL DATA SHEET

All clause number mentioned below refers to TECHNICAL PART.

A. MECHANICAL			
Sl. No.	Items	Details of Items	To be agreed by the bidders
1.0	RAPID LOAD OUT SYSTEM		
	a) Number of Hopper	1 (One) hopper for Washed coal & Washed (coal Power) (either Clean coal or washed coal(power) shall be loaded at a time) complete with all fittings and fixtures (Maintenance gates, Charging gate, Pre-weigh hopper, Discharge / loading gate, telescopic chute, hydraulics, power pack, compressor, Air blaster etc) Sub Sec.-4.4.1, Cl-1.	
	b) Hopper capacity	500 T	
	c) Loading capacity	Avg. 5500 TPH	
	d) Hopper feed conveyor	1800 mm wide	
	e) Incoming feed conveyor rate	3600 TPH	
	f) Creep speed	0.8 km/hr to 1.2 Km/hr	
	g) Hopper side slopes	Minimum valley angle 67 ⁰ (deg)	
2.0	MECHANICAL:		
2.1	Loading hopper		
	a) Size of hopper	Top of Hopper 10mX10m Drg. No. -RI-2, E&M ,300095, Rev4	
	b) Height of hopper roof top from rail top(M)	32.5m, Drg. No. -RI-II, E&M, 300095 Rev-4	
	c) Capacity of hopper	500 Tonnes, Sub sec. 4.4.1 ,cl. 1 .b	
	d) Hopper side slopes (Degree)	Min. Valley angle-67° Sub sec. -4.4.1, Cl.-1 (g)	
2.2	Level Indicators		
	a) Type of level indicators provided	Ultrasonic/ Radar type complete with sensor, transmitter and limit controllers, etc and audio visual signalling system for different levels [Sub sec. -4.4.1, Cl.-5.2(iii)]	
2.3	LOAD -OUT SYSTEM		
2.3.1	Hopper Outlet Gates		
	a) Type of Gates	Double bladed bi-parting slide gates.(Sub sec.- 4.4.1, Cl.-5.3)	
	b) Number of Gates	Four (4) no. quick acting hydraulically operated guillotine type double blade knife edged hopper discharge gates and four (4) number of hydraulically operated maintenance gates (Sub sec. - 4.4.1, Cl.-5.3.1)	

Claus	Items	Details of Items	To be agreed by the bidders
2.3.2	Pre-Weigh Hopper		
	a) Capacity(Te)	72 Te (Sub sec. -4.4.1, Cl.- 6.0)	
	b) Angle of sloping sides (Degree)	72° (Sub sec. -4.4.1, Cl.- 6.0)	
2.3.3	Discharge gate :		
	a) Type of gate	Horizontal slide blade non jamming type.(Sub sec 4.4.1,cl- 6.2)	
	b) Opening size of gate	1525mm x 1525mm (Sub sec. - 4.4.1, Cl.-6.2)	
	c) Number of hydraulic cylinders used for gate operation	2 Nos. (Sub Sec. -4.4.1, Cl.-6.2(ii))	
2.3.4	Telescopic chute:		
	a) Opening Size of telescopic chute	1525mm x 1525mm bottom discharge (Sub sec. - 4.4.1, Cl.-7)	
	b) Type of movement of telescopic chute	Both horizontally and vertically. [Sub sec. - 4.4.1, Cl.-7 (i)]	
	c) Nominal opening Range & play of telescopic chute	3.9 M and/or as per Railway but for electric engine, the unwired zone of electric traction shall be 7.8 m. and must play between 3.93m to 5.5m roughly . [Sub sec. - 4.4.1, Cl.-7 (x)]	
	d) Thickness of chute plate	10 mm [Sub sec. - 4.4.1, Cl.-7 (iv)]	
2.3.5	Hydraulic system		
2.3.5.1	Hydraulic Power Pack		
	a) Number of hydraulic power pack	One hydraulic system shall be supplied for operation of each of the hopper outlet gates, the flood loading gate & the chute system. There shall be a complete stand by power pack arrangement to provide back up in the event of failure of system). [Sub sec. - 4.4.1, Cl.-8.1]	
	b) Motor type	Squirrel cage induction motor suitable for system for 415± 10% Volts (to be decided during Detailed Design Engg.) [Sub sec. - 4.4.1, Cl.-8.1]	
2.3.5.2	Hydraulic Accumulator :		
	a) Type of accumulator	The accumulator shall have sufficient capacity for a normal open/ close of hopper outlet emergency or flood loading gate. The accumulator system shall also include necessary hydraulic/ electric control with audio visual alarms. Hydraulic accumulator control should have pressure release valve to be controlled from console. [Sub sec. -4.4.1, Cl.- 8.2]	
	b) Volume of hydraulic accumulator	As per requirement and to be decided during Detailed Design Engg.	

2.3.5.3	Hydraulic Cylinders	
	a) Type of hydraulic cylinders (mm)	Hydraulic cylinder shall be of Suitable bore and stroke double acting cylinders with cushioned ends and to be decided during Detailed Design Engg. (Sub sec. -4.4.1, Cl.- 8.3.)

Claus	Items	Details of Items	To be agreed by the bidders
2.3.5.4	Pre-weigh System - Test weights & accuracy		
	a) Type of calibration system	For testing and calibrating the pre weigh hopper system, test weights shall be supplied with the system. These test weights shall be approved by weights and measures department. [Sub sec. -4.4.1, Cl.- 6.1]	
	b) Capability of Weighment Accuracy	UU+UU 0.1 % of the set point & [Sub sec. -4.4.1, Cl.- 6.1] (to be decided during Detailed Design Engg.)	
2.4	Dust control system		
	a) Number of nozzles for each discharge chute	As per system requirement (To be decided during Detailed Design Engg.)	
	b) Consumptive water requirement for each nozzles (Cu.M./Hr.)	As per system requirement (to be decided during Detailed Design Engg.)	
	c) Operating pressure (BAR)	The nozzles shall provide high pressure atomised sprays (Sub sec. -4.4.1, Cl.- 9.1). (To be decided during Detailed Design Engg.)	
	d) Total quantum of water required for dust suppression of discharge chutes (Cu.M./Hr.)	As per system requirement (To be decided during Detailed Design Engg.)	
	e) Pump capacity (Water) (Cu.M./Hr.)	As per system requirement (To be decided during Detailed Design Engg.)	
	f) Drive motor power for the pumps (KW)	As per system requirement (To be decided during Detailed Design Engg.)	
2.5	Passenger lift		
	a) Type	Freight-cum -passenger lift	
	b) Quantity required	One	
	c) Capacity	1000 kg (.Sub sec. -4.4.1, Cl.-14. 2.0.)	
	d) Lift Size	As per relevant IS.	
2.6	Chain pulley block		
	a) Number of chain pulley blocks to be provided	Necessary Chain Pulley blocks of adequate capacity at suitable points shall be provided in respective floors and intermediate floors for hoisting and lowering of equipment/ components. The number & capacity will be fixed during detail design stage [Sub sec.-4.4.1, Cl.- 10].	
	b) Lifting capacity (Te)	Capacity will be fixed during detail design stage (Sub-section-4.4.1, Cl. 10.0)	
	c) Height of lift (Metres)	As per requirement (To be decided during Detailed Design Engg.)	

2.7	Fire-fighting system		
	a) Type of Pump	Centrifugal type[Sub sec. -4.4.1, Cl.-15.2.1]	
	b) Pressure of Pump	Suitable for 7 kg/cm ² [Sub sec. -4.4.1, Cl.- 15.2.1]	
	c) Motor Rating	As per system requirement. (To be decided during Detailed Design Engg.)	
	d) Capacity	As per system requirement. (To be decided during Detailed Design Engg.)	
2.8	Fire detection system		
	a) Type	Conventional wired type [Sub sec.-4.4.1, Cl.-15.2.2]	
	b) System voltage	As per system requirement. (To be decided during Detailed Design Engg.)	
	c) Compliance with standard	Sub Sec 4.4.1 Cl. 16.1.0 (To be decided during Detailed Design Engg.)	
2.9	OHE	OHE as per RDSO guidelines no: T1 /M1/0044 (09/2017) Rev-1 dated 18.9.2017.	

B. ELECTRICAL			
Sl. no.	Items	Details of Items	To be agreed by the bidders
3.1	Motor control centre (MCC) :		
	Type (Single / Double front)	Single front (Sub sec 4.4.2, ES-1, Cl. 3.1,)	
	Fault level	Highest Fault level- 31 MVA (Sub sec 4.4.2,ES-1, Cl. 2.2,)	
	Material of the busbars	Aluminium alloy/ Copper (Sub sec 4.4.2 , ES-1, Cl. 4.2)	
	Whether fully drawout type or otherwise	fully draw-out (Sub sec 4.4.2 , ES-1, Cl. 3.14)	
3.2	CONTROL CONSOLE		
	Type of control Electronical/ Solid State/ Micro-Processor Based.	Microprocessor, [Sub sec 4.4.2, ES-3, Cl. 1.1]	
	Whether with audio visual annunciation or not	Audio Visual, [Sub sec 4.4.2 ,ES-3, Cl. 1.1]	
3.3	Moulded case circuit breaker :		
	1)Rated voltage	415 V ($\pm 10\%$) (Sub sec 4.4.2, ES-1, 8.1)	
	2)Highest system voltage	2.5 kV for 1 min for Bus Bars & Breakers , Switches & Contactors. 2 kV for 1 min for Relays , Timers , Transformers.(Sub sec 4.4.2, ES-1, Annexure -I, Sl.no.-10)	
	3)No. Of poles	3 pole / 4 pole[Sub sec 4.4.2, ES-1, Cl-8.2(1)]	
	4)Frequency	50 Hz ($\pm 3\%$) (Sub sec 4.4.2, ES-1, Cl-8.1)	
	5)Symmetrical Breaking Capacity	50 KA(P1 category duty cycle) Sub Sec-4.4.8.1 ES-1 Cl. No 8.1,	
	6)Type of protection envisaged	Over Load & Short Circuit IP-52(indoor) & IP-55(outdoor) (Sub sec 4.4.2 , ES-1, Annexure -I)	

Claus	Items	Details of Items	To be agreed by the bidders
	7)Interrupter		
	a)Interrupter type	Arc splitters., magnetic blow outs and chutes Sub sec 4.4.2 , ES-1, Cl. 8.2(5)	
	10)IS code No.	13947 Part-1 (Sub sec 4.4.2 , ES-1 Cl. 8)	
	8)Panel		
	Short Time Rating for 1 sec.	50 KA (Sub sec 4.4.2 ,ES-1, Annexure -I)	
	Cable entry	Bottom / Top (Sub sec 4.4.2, ES-1 Cl. 3.18)	
	Bus duct	As per system requirement	
	Type of front	Single front (Sub sec 4.4.2 , ES-1 Cl. 3.1)	
	Sheet Steel thickness	≥2 mm (Sub sec 4.4.2 , ES-1 Cl. 3.2)	
	Indications on panel/ Push buttons	ON, OFF, Trip, Service, Test (Sub sec 4.4.2, ES-1 Cl. 16)	
	Meters on panel	All indicating & integrator motors flush mounted on panel (Sub sec 4.4.2 , ES-1,Cl. 15.2, 15.3 & 15.4)	
	IS code No. & protection of enclosure	Outdoor switch board IP 54 as per IS code 2147, switch board-IP 52, IS-2147 and Bus duct chamber-IP 42 Where Bus Duct for volting 1600A & above. (Sub sec.4.4.2, ES-1,Cl.no.3.5)	
	Details of any other additional facility/ instruments / protection Provided	IDMT relay / E/F relay /Master relay/ Control of fuses/ CTs & PTs (Sub.sec. 4.4.2, ES-1,Cl.-13,14)	
3.4	Switch Fuse Units		
	a)Fuses		
	i)Type(HRC)	Cartridge fuse link type HRC (Sub sec 4.4.2 , ES-1 Cl. 12)	
	b) IS code No. & protection of enclosure	IS 13947 Part-3 (Sub sec 4.4.2, ES-1,)	

Claus	Items	Details of Items	To be agreed by the bidders
3.5	MINIATURE/RESIDUAL CURRENT CIRCUIT BREAKERS AND DISTRIBUTION BOARDS :		
	1)Type	inverse time delayed thermal trip device and an un delayed magnetic trip device (Sub sec 4.4.2, ES-7, C, Cl-2)	
	2)Nominal System voltage	230 V (L-L)(±10%) (Sub sec 4.4.2 ,ES-7, C, Technical Specification)	
	3)Highest system voltage	230-240V (L-L)(±10%) [Sub sec 4.4.2 , ES-7, C, Tech. Specification]	
	4)Frequency	50 Hz(±3%)(Sub sec 4.4.2 , ES-7, C,Tech. Specification Constructional features).	
	5)Breaking capacity	9 KA (rms) / 9kA for 1 sec (Sub sec 4.4.2, ES-7, C, Tech. Specificationsl.-4Constructional features)	
	6)Type of protection over load, Earth Leakage / instantaneous /under voltage etc.)	O/L, S/C & IP 43 protection (Sub sec 4.4.2, ES-7, C, Cl.-1)	
	7)Mounting	Channel & flush Mounting for mounting in4 ways/ 8 ways/ 16 ways distribution load with IP 42 protection (Subsec.4.4.2 ES-7, E,Cl.-General Tech. Specification sl.-6)	
	8)Padlocking facility	Padlocking facility to be provided (Subsec.4.4.2 , ES-7, E, Tech. Specification Sl.-10)	
	9)Standards to conform	IS 8828 (Sub sec 4.4.2 ,ES-7, E,ScopeTech. Specification Sl. 1) & IS 8623(Sl.-1)	
3.6	INDUCTION MOTOR:		
	1)Type of motor	TEFC (Squirrel cage or slip ring type) (Sub sec 4.4.2 ,ES-5, Technical parameters) and class B & class “F” .	
	2)Degree of protection envisaged	IP 44 (indoor) , IP 55 (outdoor) (Sub sec 4.4.2 , ES-5, Technical parameters & IP-54 for technically Sl.-10/11)	
	3)Standards to conform	IS 325 (Sub sec 4.4.2 , ES-5, Technical parameters, Sl.-1)	
	4)Insulation class	Class B for 415 V (Sub sec 4.4.2 , ES-5, Technical parameters.,Sl.-7)	

Clause	Items	Details of Items	To be agreed by the bidders
3.7	TRANSFORMERS :		
	1)Service/Location	Indoor (Sub sec 4.4.2 , ES-6, Tech. Parameter Sl.-2)	
	2)Rated Voltage	415 Volts +/- 10%, 235 volts (L-L) \pm 10% (ES-6 ,Technical parameters, Sl.-7)	
	a)Rated kVA	100 KVA (Sub sec 4.4.2 , ES-6,Technical parameters,Sl.-1)	
	b)Rated voltage of HV	415 V (Sub sec 4.4.2 , ES-6,Technical parameters, Sl.-7)	
	c)Rated voltage of LV	230 V (L-L) (Sub sec 4.4.2 , ES-6,Technical parameters, Sl.-7)	
	3)No. of phases	3 phase. (Subsec-4.3.1. Cl. 4.3.15)	
	4)Vector group/ Connection Symbol	Delta /Star (DY-II), winding SLG	
	5) Tappings	7 steps (+ - 2.5, +-5 ,+- 7.5) (Sub sec 4.4.2 , ES-6 Technical parameters, Sl.-14)	
	6)Terminal Arrangement		
	a)High voltage	Cable box [Sub sec 4.4.2 , ES-6 ,Technical parameters sl no. 15.a]	
	b)Low voltage	Cable box [Sub sec 4.4.2 , ES-6 ,Technical parameters sl. No. 15.b]	
	c)Reference standard	IS 2026 for transformer and IS 335 for oil used [Sub sec 4.4.2, ES-6,Technical parameters, Sl-18/19]	
3.8	LIGHTING		
	1)Type of luminaries	LED	
3.9	SWITCHBOARDS FOR LIGHTING CIRCUITS		
	1)Rated voltage	230 V (Sub sec 4.4.2 , ES-7,G, Technical Information, Sl. No. 1)	
	2)Top cover of the board	Decorative bakelite (3mm thick) (Sub sec 4.4.2, ES-7,G, Technical information Sl. No. 6)	

Claus	Items	Details of Items	To be agreed by the bidders
3.10	EARTHING		
	1)Type of material of down conductor	GS flat, 65x8mm (Sub sec 4.4.2 , Annexure-ES11, Cl.-3 construction)	
	2)Type and material of earth conductors	GS flat on surface & MS below soil (Sub sec 4.4.2 , Annexure-ES11)	
	3)Type and material of earth electrodes	MS pipe more than 38mm dia(Sub sec 4.4.2 , Annexure-ES11Cl.-3 construction)	
	4)Whether separate earthing for lightning	Independent earth pit shall be provided for lightning by GS flat 65 x 8mm(Sub sec 4.4.2, Annexure-ES11, Cl.-3 construction)	
3.11	Cable :		
	1)Type of power cable with voltage grade	650 V / 1100 V grade PVC insulator(heavy duty) approved Aluminium Conductor Cable (Sub sec 4.4.2 , ES-9,Cl-1)	
	2)Type of lighting & fan cable with voltage grade	650 V / 1100 V grade PVC insulated unarmouredAluminium Conductor electrical cable (Sub sec 4.4.2 ,ES-9 Cl.-2)	
	3)Type of control cable with voltage grade	650 V / 1100 V grade PVC insulated unarmoured Cu Conductor control cable (Sub sec 4.4.2 ES-9,Cl.- 3)	
3.12	Welding system :		
	1)Type	Centralised welding circuit having adequate nos. socket outlet of adequate capacity for direct connection of welding cable through plugs. Power socket (Sub sec 4.4.2 , Annexure ES-12, cl.-1)	
	2)No. of welding sets	2 nos. (Sub sec 4.4.2 , Annexure ES-12, Cl.-1)	
	(a)Motor Generator sets	Two nos.	
	(b)Transformer welding sets	2 nos. suitable for 415V ±10%, 3 Ø, 50 Hz AC system (Sub sec 4.4.2 Annexure ES-12, Cl.-2)	
	3)Current range	a) 80 A - 450 A & b) 180 - 350 A (Sub sec 4.4.2, Annexure ES-12, Cl.-2)	
	4)Corresponding voltage	a) 80 V open ckt. for 80-450 Amps b) 100 V open ckt for 180 to 350 Amps (Sub sec 4.4.2, Annexure ES-12, Cl.-2)	

Claus	Items	Details of Items	To be agreed by the bidders
3.13	CENTRALISED REMOTE & SEQUENCE CONTROL		
3.13.1	Control desk		
	1)Standards to which conform	IS 8623 (Sub sec 4.4.2 Annexure ES-2, Cl.-1)	
	2)Type of enclosure	CR sheet steel not less than 1.6mm with protection IP 52 as per IS 2147 (Sub sec 4.4.2 , Annexure ES-2, Cl. 3.2.1)	
	3)Control switch type	Rotary type / Spring return / stay put (Sub sec 4.4.2 , Annexure ES-2, Cl. 3.2.2)	
	4)Push button type	Spring return / push to actuateand rated to make continuously carry & break 6A at 240 V 0.5A(inductive) at 220V (Sub sec 4.4.2, Annexure ES-2, Cl 3.2.3)	
	5)Ammeter/voltmeter selector switch type	4 stay-put position with adequate nos. of contacts. Ammeter shall here make break type contact to prevent open circuiting (Sub sec 4.4.2 , Annexure ES-2, Cl 3.2.2)	
	6)Indicating Lamps type	Panel mounted FILAMENT / LED with caps of colored translucent (Sub sec 4.4.2, Annexure ES-2, Cl -3.2.4)	
	7)(i)Space heater type	Where ever consider necessary (Sub sec 4.4.2, Annexure ES-2, Cl3. 2.15)	
	ii)Whether thermostat provided	Automatically controlled by thermostat (Sub sec 4.4.2 , Annexure ES-2, Cl -3.2.15)	
	8)(i)Terminal blocks type	650V grade rated for 10A and are piece moulding type &clip-on type (Sub sec 4.4.2, Annexure ES-2, Cl 3.2.12)	
	ii)Whether 20% spare terminals provided	20% spare terminal shall be provided (Sub sec 4.4.2, Annexure ES-2, Cl 3.2.12)	
3.13.2	Programmable Logic Controller		
	A)CPU	To achieve all logical processing by exceeding insulator in CPU (Sub sec 4.4.2 , Annexure-ES3,)	
	B)Input/Output subsystem	A programmable memory for internal storage of instruction for implementing specific function such as logic sequencing & digital input/output of various (Sub sec 4.4.2,Annexure ES-2 cl 4.2)	

Claus	Items	Details of Items	To be agreed by the bidders
	C) Console subsystem	Lot (as per requirement) (to be decided during Detailed Design Engg.)	
	i) Operator station (Nos.)	Lot (as per requirement) (to be decided during Detailed Design Engg.)	
	ii) PC with printer (Nos.)	As per requirement (to be decided during Detailed Design Engg.)	
	D)Communication subsystem	Suitable no. ADT(Automatic Dial type) telephone, Loud hailing, connection with exchange of owner (Sub sec 4.3, Cl.4.3.7)	
	E)Software packages	Latest Version for easily re-configurable software as per system requirement (to be decided during Detailed Design Engg.)	
	F)UPS with cabinet	Sufficient capacity with redundancy and suitable batteries having 30 min back up to power supply to the plant. (Sub sec 4.4.2, ES-2,Cl-2 & Cl.4.3.11 and to be decided during Detailed Design Engg.)	
	G)Computer mimic & VDU	26" (min) TFT/LCD monitor (Sub sec 4.4.2, ES-3,Cl .1.1)	
	H)Laptop Qty and configuration	2 No. Of latest model with laser printers for E IC and one addition laptop. Sub sec 4.3.1, Cl 4.3.13)	
	I)Laptop computer: Quantity & Configuration		
	i))Enclosure protection class	IP 52 (Sub sec 4.4.2, ES-2 Cl. 3.2.1)	
	ii))Internal wiring size , type	650 V grade single core, color coded PVC insulation copper 1.5 sq.mm or larger (Sub sec 4.4.2, ES-2 Cl. 3.2.13)	
	iii))Illumination of panels features	Filament/LED type (Sub sec 4.4.2, ES-2 Cl. 3.2.4)	
	LOCAL CONTROL STATION		
	1)Type	Wall mounting or steel structure for indoor or outdoor (Sub sec 4.4.2 ,Annexure-ES-4, Cl. 1)	
	2)Degree of enclosure protection	IP 53 for dust & vermin proof (Sub sec 4.4.2, ES-4 Cl-1)	
	3)Facilities provided	Emergency stop, self reset Trial Run &self reset trial Stop, Local & Remote, (Sub sec 4.4.2, ES-4 Cl. 1(i, ii, iii))	

Claus	Items	Details of Items	To be agreed by the bidders
3.14	INVERTER SET FOR EMEGENCY LIGHT		
DG Set	1)Type	Auto cum manual starting DG Set for emergency light as per system requirement (to be decided during Detailed Design Engg.)	
	2)Rated kVA	25KVA / As per system requirement (Sub sec.4.3,Cl.4.3.3,)	
Inverter	1)Rated KVA	As per system requirement (To be decided during Detailed Design Engg.)	
	2)No. of Inverter	3 Nos (for switch room, control room & loading point) .As per system requirement (to be decided during Detailed Design Engg.)	
	3)Whether automatic switching	As per system requirement for Auto cum Manual starting (to be decided during Detailed Design Engg.)	
3.15	PRESSURISATION & AIR CONDITIONING		
	A)Pressurisation		
	1)Other details	Sub sec. 4.3.1,Cl. 4.3.14	
	B)Air Conditioning		
	1)Type	Split type (Sub sec. 4.3.1 cl. 4.3.14)	
	2)Other details	Sub sec. 4.3.1 cl. 4.3.14	
3.16	CAPACITOR BANK (415 V)		
	1)Installation	415V shunt Capacitor bank suitable for indoor installation (Sub sec 4.4.2 , Annexure-ES-13, Cl-1.1)	
	2)Rated voltage	415 V (Sub sec 4.4.2, ES-13 Annexure-I)	
	3)Frequency	50 Hz. (Sub sec 4.4.2, ES-13 Annexure-I)	
	4)Phases	3 (Sub sec 4.4.2, ES-13 Annexure-I)	
	5)Rated output	As per system requirement (Sub sec 4.4.2, ES-13 Annexure-I) (to be decided during Detailed Design Engg.)	
	6)Operation	Automatic	
	7)Protections	a time delay relay be incorporated for stage to stage switching	
	8)Standards	IS 2834 & IEC 831-1, 831-2 (Sub sec 4.4.2, ,ES-13 Annexure-I)	

Deleted

Annexure – K

FORMAT FOR UNCONDITIONAL BANK GUARANTEE IN LIEU OF RECEIVING PAYMENT AGAINST THE SECURITY DEPOSIT ACCRUED BY PAYING THE RUNNING BILL AT 95%, i.e THE RETENTION MONEY DEDUCTED @ 5% FROM RUNNINGBILLS.

To
M/s. Bharat Coking Coal Limited
Koyla Bhawan, Koyla Nagar
Dhanbad – 826005

Sub : Bank Guarantee No. Date
Bank Guarantee Amount INR / Rs. { (Indian Rupees(in words) }
Valid up to
Claim Period up to

Ref: Application No. Dated submitted by M/s.
(Contractor) and letter No. dated issued by General Manager,
..... Area, BCCL.

M/s. (Name and Address of the Contractor) (hereinafter called the Contractor) has entered into a contract under NIT No. dt..... LOA vide letter No. dt..... and work order / Agreement no. dt..... (hereinafter called the said contract) with M/s. Bharat Coking Coal Limited (hereinafter called the Company) to execute (name of the contract and brief description of work) on the terms and conditions contained in the said contract.

The Contractor agreed that it shall furnish the Bank Guarantee from a Nationalised / Scheduled Bank encashable at Dhanbad Branch / Kolkata Branch for a sum of INR (Indian Rupees) as security in lieu for receiving payment against the Security deposit accrued annually by paying the running bill at 95%, i.e the Retention money deducted @ 5% from running bills.

The (Name of the Bank) having Registered Office atand one of its branches athas at the request of this contractor agreed to give this Guarantor herein under contained.

We, the, Bank (hereinafter called “the Bank”) do hereby unconditionally agreed with the Company that the Bank shall merely on demand in writing without raising any question or objection or demur shall pay to the company the said sum of INR (Indian Rupees) or such portion as shall then remain due without requiring the Company to have recourse to any legal remedy that may be available to it to compel the Bank to pay the sum or calling on the company to compel such payment by the contractor.

Any such demand shall be conclusive as regards the liability of the Contractor to the Company and as regards the amount payable by the Bank under this Guarantee. The Bank shall not be entitled to withhold payment on any ground that the Contractor has disputed its liability to pay or has disputed the quantum of the amount or that any arbitration proceeding or any legal proceeding is pending between the company and the contractor regarding the claim in any forum.

We, the Bank further agree that the Guarantee shall come into force from the date hereof and shall remain in force and effect till (90 days after the end date of scheduled completion and to be extended for minimum period of 1(One) year in one instance which must cover a time period of 90 days beyond completion of Defect Liability period. However, if so required by the company, before expiry of the validity of this guarantee, the bank shall renew the period of validity of the Bank Guarantee against request for a further period, if the period of contract is extended either pursuant to the provisions in the said contract or by mutual agreement between the contractor and the company, failing which it shall pay to the company the said sum of INR (Indian Rupees) or such lesser amount of the said

sum of INR (Indian Rupees) as may be due to the company and as the company may demand.

This Guarantee shall remain in force until the dues of the company in respect of the said sum of INR (Indian Rupees) and interest are fully satisfied and the Company certifies that the Contract has been successfully carried out by the contractor and discharged the guarantee.

The Bank further agrees with the company that the company shall have the fullest liberty without consent of the bank and without affecting in any way the obligations hereunder to vary any of the terms and conditions of the said contract from time to time, to extend time for performance of the said contract from time to time or to postpone for any time or from time to time any of the powers exercisable by the company against the contractor and to forbear to enforce any of the terms and conditions relating to the said contract and the bank shall not be relieved from its liability by reason of such failure or extension being granted to the contractor or to any forbearance, act or omissions on the part of the company or any indulgence by the company to the contractor or any other matter or thing whatsoever under the law relating to sureties would but for this provision have the effect of relieving or discharging the Guarantor.

The Bank further agrees that in case this Guarantee is required for a longer period and it is not extended by the Bank beyond the period specified above the Bank shall pay to the Company against service of their written claim on the Bank within, the said sum of INR (Indian Rupees) or such lesser sum as may then be deemed to the company and as the company may require.

Notwithstanding anything contained herein the liability of the Bank under this Guarantee is restricted to INR (Indian Rupees) the guarantee shall remain in force till the day of and unless the guarantee is renewed or claim is preferred against the bank within the said date all rights of the company under this guarantee shall cease and the bank shall be relieved and discharged from all liabilities hereunder except as provided in the preceding clause.

The Bank Guarantee as referred above shall also be encashable at Dhanbad Branch / Kolkata Branch at (pl. Specify name of the Branch with address).

This guarantee shall not be discharged due to the change in the constitution of the Bank or the contractor.

The Bank has under its constitution power to give this Guarantee and Sri & Sri who have signed it on behalf of the Bank have authority to do so on mentioning identity code no. of the said signatories.

Dated, this day of

Signature of the authorised person

For and on behalf of the Bank

Place

Under Jurisdiction of Dhanbad Court only.

The User Portal Agreement

The bidder shall accept User Portal Agreement online during bid submission as per prescribed format available in portal. User Portal Agreement will be the part of tender document.

Deleted

PROFORMA OF JOINT VENTURE AGREEMENT

(On Non-Judicial Stamp paper of appropriate value as per provision of the Stamp Act applicable in the concerned state)

This Joint Venture agreement is made on thisday of.....

AMONGST/BETWEEN

M/s....., having its registered Office at

Represented by Shri.....(Name and Designation) of M/s.....Who has power of Attorney to enter into Joint Venture with.....and

Sign all documents/agreements on behalf of M/s..... (hereinafter referred to as".....")

AND

M/s....., having its registered Office at

Represented by Shri.....(Name and Designation) of M/s.....who has power of Attorney to enter into Joint Venture with.....and

Sign all documents/agreements on behalf of M/s..... (hereinafter referred to as".....").

The expressions M/sand M/s.....Shall, wherever the context admits, mean and include their respective legal representatives, successors-in-interest and assigns and shall collectively be referred to as "Joint Venture / Parties" and individually as "Joint Venture /Party".

WHEREAS M/s.....and M/s.....agreed to form a Joint Venture in order to join their forces to obtain best results from the combinations of their individual resources of technical and management skill, finance and equipment for the benefit of the project and in order to submit the Bid for the work of

"..... (hereinafter referred to as "Project") under.....(Name of Company(hereinafter referred to as "the principle Employer").

The Parties hereby enter into this Joint Venture Agreement (hereinafter referred to as "Joint Venture") to jointly prepare and submit the Bid for the Project and in the event of securing the Project from the Employer, to execute the Project in accordance with the Contract terms and conditions, to the satisfaction of the Principal Employer.

NOW THEREFORE, the parties, in consideration of the mutual premises contained herein, agree as follows:

1) FORMATION AND TERMINATION OF THE JOINT VENTURE.

The parties under this Agreement have decided to form a Joint Venture to submit the Bid for the above Project and execute the Contract with the Principal Employer for the Project, if qualified and awarded.

- a) The name and style of the Joint Venture shall be "....." (hereinafter called the "Joint Venture")
- b) The Head Office of the Joint Venture shall be located at..... and the site office will be located at the site of the Project. All communication regarding the project will be made to..... Telephone Nos.....
- c) None of the parties of the Joint Venture shall be allowed to assign, pledge, sell or otherwise dispose all or part of its respective interests in the Joint Venture to any party including the existing partner of the Joint Venture.
- d) The term of the Joint Venture shall begin as on the date first set forth above and shall terminate on the earliest of the following dates.
 - i) The Joint Venture fails to obtain qualification from the Employer.
 - ii) The Contract for the Project is not awarded to the Joint Venture.
 - iii) The Employer cancels the Project
 - iv) Either Party commits material breach of this Agreement and fails to cure such breach within the period designated by the non-defaulting Party
 - v) Both parties agree to terminate this Agreement in writing.

vi) The Project is completed including defects liability period to the satisfaction of the Employer and all the parties complete any and all duties, liabilities and responsibilities under or in connection with the Contract and the Joint Venture Agreement.

2) **LEAD PARTNER.**

M/s..... shall be the Lead Partner of the Joint Venture and is responsible for performing a key function in contract management. M/s..... shall be attorney of the parties duly authorized to incur liabilities and receive instructions for and on behalf of any and all partners in the Joint Venture and also all the partners of the Joint Venture shall be jointly and severally liable during the bidding process and for the execution of the contract as per contract terms with the employer in accordance with the power of attorney annexed. All Joint Venture partners M/s..... & M/s..... nominate and authorize Shri..... (name and designation) of M/s..... to sign all letters, correspondence, papers & certificates and to submit the Pre-qualification Application / Bid documents for and on behalf of the Joint Venture.

REPRESENTATIVE OF THE PARTNERS OF THE JOINT VENTURE.

Each constituent party of the Joint Venture appoints the following personnel as the representative of the relevant party with full power of attorney from the Board of Directors of the concerned company.

<u>JOINT VENTURE</u>	<u>Partner</u>	<u>Name</u>	<u>Position in the respective Company</u>
M/s.....
M/s.....

3) **PARTICIPATION SHARE & WORK RESPONSIBILITIES.**

4.1 The parties agree that their respective participation share (hereinafter called ‘Participation Share’) in the Joint Venture shall be as follows:

- M/s..... :% (.....per cent)
- M/s..... :% (.....per cent) and
- M/s..... :% (.....per cent)

4.2 The Parties shall share the rights and obligations, risk, cost and expenses, working capitals, profits or losses or others arising out of or in relation to execution of the Project in proportion to their share of participation in the Joint Venture except as otherwise agreed.

4.3 The parties shall jointly execute the works under the Project as an integrated entity and allocate responsibilities as regards division of work between themselves by organizing the adequate resources for successful completion of the Project. However all parties shall remain jointly and severally responsible for the satisfactory execution of the Project in accordance with the Contract terms and conditions.

4) **JOINT AND SEVERAL LIABILITIES.**

All partner of Joint Venture shall be liable jointly and severally during the Pre-qualification and Bidding process; and in the event the contract is awarded, during the execution of the Contract, in accordance with Contract terms.

5) **WORKING CAPITAL**

Each party shall contribute working capital for equipment, labour and material or any expenses incurred for execution of the Project or any other investment required in connection with the execution of the project proportionate to the participation ratio.

6) **BID SECURITY:**

Bid Security, Performance Security and other securities shall be paid by the Joint Venture except as otherwise agreed.

7) **PERSONNEL & EQUIPMENT**

Team of Managers / Engineers of all the partners of the Joint Venture will form part of the core management structure and assist in execution of the project. The list of Personnel and equipment proposed to be engaged for the project by each Party will be decided by the management committee.

8) NON PERFORMANCE OF RESPONSIBILITY BY ANY PARTY OF JOINT VENTURE.

- a) As between themselves, each Party shall be fully responsible for the fulfillment of all obligations arising out of its scope of the work for the Project to be clarified subject to the Agreement between the Parties and shall hold harmless and indemnified against any damage arising from its default or non-fulfillment of such obligations.
- b) If any Party fails to perform its obligations described in this Agreement during the execution of the Project and to cure such breach within the period designated by the non-defaulting party, then the other party shall have the right to take up work, the interest and responsibilities of the defaulting party at the cost of the defaulting party.
- c) Stepping into the shoes of the existing partner of Joint Venture with all the liabilities of the existing partner from the beginning of the contract with the prior approval of company.
- d) Notwithstanding demarcation or allotment of work of between/amongst Joint Venture, Joint Venture shall be liable for non-performance of the whole contract irrespective of their demarcation or share of work.
- e) In case bid being accepted by Company, the payments under the contract shall only be made to the Joint Venture and not to the individual partners.

9) BANK A/C.

Separate Bank A/c. shall be opened in the name of the Joint Venture in a scheduled or Nationalized Bank in India as per mutual Agreement and all payments due to the Joint Venture shall be received only in that account, which shall be operated jointly by the representative of the Parties hereto. The financial obligations of the Joint Venture shall be discharged through the said Joint Venture Bank Account only and also all the payments received or paid by company to the Joint Venture shall be through that account alone.

10) LIMIT OF JOINT VENTURE ACTIVITIES.

The Joint Venture activities are limited to the bidding and in case of award, to the performance of the Contract for the Project according to the conditions of the Contract with the Employer.

11) TAXES.

Each Party shall be responsible for its own taxes, duties and other levies to be imposed on each party in connection with the Project. The taxes, duties and other levies imposed on the Joint Venture in connection with the Project shall be paid from the account of the Joint Venture.

12) EXCLUSIVITY

The Parties hereto agree and undertake that they shall not directly or indirectly either individually or with other party or parties take part in the Bid for the said Project. Each Party further guarantee to the other party hereto that this undertaking shall also apply to its subsidiaries and companies under its direct or indirect control.

13) MISCELLANEOUS:

- a. Neither party of the Joint Venture shall assign, pledge, sell or otherwise dispose all or part of its respective interests in the Joint Venture to a third party without the Agreement of the other parties in writing and also without the permission of the Employer.
- b. Subject to the above clause, the terms and conditions of this agreement shall be binding upon the parties, the Directors, Officers, Employees, Successors, Assigns and Representatives.

14) APPLICABLE LAW

This agreement shall be interpreted under laws and regulations of India.

IN WITNESS Whereof the Parties hereto have hereunder set their respective hands and seals the day, month, year first above written.

For

Signature _____

(Name &Address)

.....

For.....

Signature _____

(Name& Address)

.....

(Official Seal)

Place

Date

Witness

Signature

(Name &Address)

.....

(Official Seal)

Place

Date

Witness

Signature

(Name &Address)

.....

TECHNICAL

SECTION -4
TECHNICAL SPECIFICATION
(MECHANICAL, ELECTRICAL & CIVIL)

SUB-SECTION-4.1

PREAMBLE

1.0 LOCATION:

Patherdih Washery is situated in the Dhanbad District of BCCL (a subsidiary of Coal India Ltd). The Project lies between latitude $23^{\circ} 40' 30''\text{N}$ & $23^{\circ} 40' 50''\text{N}$ and longitude $86^{\circ} 26' 10''\text{E}$ & $86^{\circ} 26' 30''\text{E}$ in the district of Dhanbad of Jharkhand state. The new washery complex has been constructed adjacent to the old (now dismantled) washery. Co-ordinates of the loading point are N 93826.368, E 94302.927 and rail top level of loading point is 166.770.

2.0 COMMUNICATION:

Pradhankhata –Patherdih cord rly. line of East Central Railway passes close to the washery and the washery is also connected with Dhanbad-Sindri road. Dhanbad railway station is 20km from the project site. Ranchi airport is about 190 km from the site. The new washery is adjacent to old Patherdihwashery (now dismantled) which is about 20 km from Dhanbad town. The nearest railway station is "Patherdih" which is about 1 km from project site.

3.0 CLIMATE:

The area experiences tropical climate and is characterized by very hot summer and cold winter. The months of May and June are very hot. The temperature varies from 20°C to 42.3°C in the study period. Relative humidity (RH) is high in the rainy days being about 97% in June and low in the month of May which is about 36%. Thunder storms usually occur in the month of May and June accompanied by temporary fall in temperature by few degrees. The temperature range is 4°C - 50°C .

The area receives annual rainfall of about 1140-1700 mm, out of which 75-80% of the annual rainfall occurs during the four months from June to September with smaller amounts during winter months. Traditionally, the monsoon is supposed to touch Dhanbad by mid June every year. They do not always correspond to these limits. A total of 149.1mm of rainfall was recorded during the study period.

South-easterly winds are predominant in the study period. A regular summer feature is hot weather winds locally called *andhi*, sometimes laden with dust (the dust storm) in the region and ultimately leads to *KalBaisakhi* originated in this Jharkhand plateau & common in West Bengal region.

4.0 ABOUT THIS TENDER:

The 5 Mty Patherdih NLW washery has been designed to produce 1.12 Mtpa of Washed coal, 2.58Mtpa Washed coal(power) and 1.30Mtpa rejects. This tender document is for construction of dispatch system of Washed coal and Washed coal(power) by rail on turnkey basis. The scope of this

tender broadly includes construction of one no. 500 tonne concrete hopper fitted with one no. rapid loading system including lift, dust suppression, fire fighting, fire detection, plant cleaning etc.

The Washed coal and Washed coal(power) produced from Washery shall be delivered by BOMO by means of matching belt conveyor to 500 Te concrete hopper to be constructed over the railway line. The in-feed Conveyor, loading chute, lifting equipment of discharge drum /assemblies are not in the scope of tenderer.

Considering the fact that high tonnage of coal has to be dispatched within the stipulated time, a rapid loading system with 500 Te concrete hopper for loading into railway wagons has been adopted.

Responsibility of matching dispatch system (under this tender document) with incoming feed conveyor (within scope of BOMO) lies with the successful bidder of this tender. Design of hopper should be done in such a way so that it is suitable for the orientation & load data of the incoming feed conveyor. For orientation, load data, etc.ofthe incoming feed conveyor, the successful bidder should discuss with BCCL and BOMO. Any other clarification, if required, may be discussed by the successful bidder with BCCL and BOMO for finalization.

The rapid loading system shall also be provided with lift, suitable fire fighting, fire detection, dust suppression and communication facilities.

5.0 GENERAL:

In case of any contradiction amongst these parts / sections of the bidding Documents, the Owner should be contacted for clarification. Also where there are discrepancies in text and drawings, the data given in the text is to be followed. All the equipment and facilities are to be supplied by the successful bidder within the estimated time period. All equipment/ systems shall be designed, fabricated and selected as per relevant Indian standard/ international standards and up to date engineering practices and necessary inspections / test certificates shall be submitted along with equipment supply to certify the quality and genuineness of critical components and capacity and other technical parameters of the equipment/ systems.

SUB-SECTION-4.2

SYSTEM DESCRIPTION AND BASIC DATA

SUB-SECTION-4.2

SYSTEM DESCRIPTION AND BASIC DATA

1.0 System Capacity

The system capacity of the rapid loading system shall be designed in such a way so that it can cater 1.12 Mtpa Washed coal and 2.58 Mtpa Washed coal(Power) within an overall rated production of 5 Mtpa from the washery. 1.30Mtpa rejects produced from the washery shall be handled separately and is beyond the scope of this tender. The Washed coal and Washed coal(Power) produced from washery shall be delivered by means of matching belt conveyor to 500 Te concrete hopper to be constructed over the railway lines.

Considering the fact that high tonnage of coal has to be dispatched within the stipulated time, a rapid loading system with one no. 500te concrete hopper for loading into railway wagons has been adopted.

2.0 Description of CHP

2.1 Loading & Wagon Movement

The wagon loading hopper shall be equipped with one set of rapid loading gates and telescopic chutes for loading into wagons. The system shall consist of one set of pre-weigh bin arrangement i.e. the required quantity of coal equivalent to the pay load capacity of the railway wagon will be discharged into the bin before it is discharged into the wagon. The weigh bins will be located below the 500 tonne capacity RCC hopper. Rapid loading telescopic chute will be placed below the weigh bin to regulate the flow of coal into wagons.

3.0Dust Suppression

Necessary measures for dust suppression shall be provided to control the dust generated at hopper loading and wagon loading point.

4.0 Fire-fighting& fire detection

Necessary measures for fire-fighting and fire detection shall be provided at various locations as mentioned elsewhere in the document. Plant cleaning system shall also be provided.

5.0 Brief description of works :

The tender is for construction of rapid loading system. The brief description of works is as under:

- a)One 500 tonne capacity wagon loading RCC hoppers with preweigh bin with high speed rapid loading system.As per RDSO guidelines no T1 /M1/0044 (09/2017) Rev-1 dated 18.9.2017, Electric Traction is to be provided below the loading point as mentioned in the guidelines applicable for rapid loading system is to be implemented. The rail track should be straight at least 50 m. i.e 25 m on each side from the center of the loading point structures. This is essential for smooth entering of the electric loco within the loading area with either pantograph up.

- b) Safety and dust control system.
- c) Liners
- d) Lift, stairs
- e) Power receiving arrangement from existing substation
- f) 1 No. of Electrical sub-station & Control room located near 500 T hopper.
- g) Remote and sequential control .
- h) Local control stations for all drives
- i) Illumination system
- j) Communication system
- k) Necessary lifting tools and tackles and spot repair facilities
- l) Plant cleaning and drainage, fire fighting and fire detection system.
- m) Design and engineering, erection and commissioning and associated civil and structural works with siteoffice and rest rooms.
- n) Drinking water and toilets and water supply system for firefighting system & dust control.
- o) Interlocking of the system with the incoming conveyor of BOMO as required.

6.0 Basic Data

Washery capacity	5 Mtpa
Washed coal production	1.12 Mtpa
Washed coal(Power) production	2.58 Mtpa
No. of working days considered/ year	330 days (However, the design should be suitable for continuous operation round the year.)
No. of working shifts/ day	3 shifts each of 8 hrs duration
No. of effective working hrs. per shift	5
Targeted ash% (monthly average basis) of washed coal	18%(apb)
Total moisture % of washed coal	Max. 9.5 %(apb.)
Targeted ash% (monthly average basis) of Washed coal(Power)	39.98% (apb.)

Total moisture% of Washed coal(Power)	Max.9% (apb.)
Bulk density (t/m ³) of washed coal	0.844 for volume calculation
Bulk density (t/m ³) of washed coal(Power)	0.926 for volume calculation
Final Product size of Washed coal and Washed coal(Power)	(-) 13 mm
No. of product	Two
Consumer	Steel plant/ power plant
Mode of dispatch	By rail through rapid loading system
No. of wagon loading point	One
Wagon marshalling	Creep controlled locomotive/Electric Engine
Capacity of RLS	5500 tph
Capacity of wagons	60t (all type of wagons)
Loading schedule	3 shifts, 7 days / week
Maximum temperature	50 ⁰ C
Minimum temperature	4 ⁰ C

SUB-SECTION-4.3.

SCOPE OF SUPPLY AND WORKS

SUB-SECTION-4.3.1
(MECHANICAL & ELECTRICAL)
SCOPE OF SUPPLY AND WORKS

1.0 GENERAL

1.1 This tender document for Rapid Loading System of Patherdih NLW Washery is for planning, design, engineering, manufacture, shop fabrication, assembly, testing, packing, transportation to site, insurance, delivery to site, receipt, unloading, handling, storage at site, fabrication at site, installation and erection, all civil & structural works and associated electrical & mechanical works and other allied auxiliary facilities such as dust suppression system, communication system, drinking water supply system, fire-fighting, plant cleaning etc.

1.2 The contract for the package will be split into two contracts - one covering the 'Supply' part and the other covering the 'Works & Services' part. Both the contracts will contain a cross fall breach clause specifying that breach of any one contract will also constitute breach of the other contract and the whole contract combined.

1.3 The equipment and works mentioned hereinafter to be read in conjunction with preamble (Sub-Section-4.1), system description and basic data sheet (Sub-Section-4.2) and technical specification (Sub-Section-4.4) are indicative and not limited to the description and/or list given.

1.4 All mechanical & electrical equipment and systems and civil works are within the scope of supply and works of contractor.

2.0 Scope of Supply

2.1 Equipment, Accessories, Facilities and Spare Parts

2.1.1 List of mechanical equipment, accessories & facilities is given in **Annexure-III.1**.

2.1.2 List of electrical equipment, accessories and testing equipment is given in **Annexure-III.2**

2.1.3 List of mandatory spare parts to be supplied by the contractor, is given in **Annexure-III.3**.

2.1.4 List of tools and tackles is given in **Annexure-III.4**

3.0 Scope of works and services

3.1 The scope of work covers all the related civil and structural works, transportation, insurance, storage at site, erection and commissioning, performance tests, detailed engineering, PAT & FAT and handing over of the plant and includes but not limited to the following:

I Design & engineering of all mechanical, electrical, civil and structural works of the plant.

II. Erection and commissioning of all the plant and equipment. Supervision at site and inspection and testing. The procurement, erection, commissioning, safety measure & drawing underneath the hopper as per RDSO guidelines no: T1 /M1/0044 (09/2017) Rev-1 dated 18.9.2017 should be approved from the Zonal Chief Electrical Engineer of the concerned Railway Zone. "The Length of OHE shall be at least 50 m, i.e. 25 m from either side of center of the RLS.(The installation

of OHE underneath Hopper shall be executed by railway Authorized Contractor & as per RDSO Guideline.)

The detailed proposal/scheme of OHE system with detailed design while ensuring safety, operability and maintainability from railway as well as load point of view for specific siding, needs to be submitted for approval of the chief Electrical Engineer of the concerned Zonal Railways.

III. Performance and guarantee tests, final acceptance.

IV. Training of Plant personnel as detailed elsewhere

V. Any other works/services not mentioned but required for the completion and commissioning of the plant.

3.2 All the items and works specified in this document and any other equipment and work found necessary, but omitted, is deemed to have been covered in the scope of supply and works in the tender without any increase in the contract price.

3.3 Obtaining approvals from Weights and Measure Department is the responsibility of the bidder.

3.4 Air, water and noise levels shall be within the permissive limits as per CPCB norms and specified in the bid document. Additional requirement and stipulation by State/ Central Pollution Control Board, if any, on the subject shall also be applicable and shall be the responsibility of bidder.

3.5 Obtaining approvals of suitable OHE system below the hopper from Chief Electrical Engineer of concerned zonal Railways is the responsibility of the bidder. Based on the RDSO guideline No.TI/MI/0044 (09/2017)Rev-1 dated 18.9.17 with latest amendment, if any, the detailed proposal /scheme of OHE system with detailed design, while ensuring safety, operability and maintainability from railway as well as loading agency point of view for specific siding, needs to be submitted to the Chief Electrical Engineer of concerned zonal Railways and approval obtained thereafter. However in case of OHE not available from railways till the completion of entire contract period, the completion of the project / performance test shall not be held due to high voltage testing of OHE underneath hopper.

3.6 Accordingly, hopper shall be designed with all statutory clearances. In case of Delayed Installation of OHE & Completion of Installation of RLS, PAT-FAT Tests may be conducted with Diesel Loco. Defect Liability for a period of 60 Months will commence immediately upon the satisfactory completion of the Performance Guarantee (PG) Test as mentioned in Commercial Part of Tender Document.

No sooner the line is made available by railways, the successful bidder shall conduct the performance test of high voltage testing underneath the hopper for its complete operational and safety parameters as Prescribed in the RDSO guidelines.

3.7 Adherence to Indian Standards

All the works including designs, drawings, construction, fabrication, testing, erection, etc. shall be done strictly as per Indian Standards. In absence of Indian standards, International standards like British, American, German or Russian may be used. A copy of the standard used shall be furnished

along with the concerned drawing /document during approval.

3.8 The equipment list indicates only broad parameters and the accessories required for successful commissioning / operation of Rapid loading system shall be considered to be part of the total works. The other terms and conditions of works including technical, commercial, etc. shall be governed by the clauses of the bid and contract.

3.9 The technical parameters to be furnished are subject to scrutiny/ approval at the detailed design stage which may undergo minor changes keeping in view the system requirement and various codes of practices/regulation by the statutory bodies. This shall be applicable for drawings also. The parameters not specifically mentioned in the bid document shall be decided at the time of finalisation of contract document on mutually agreed by the selected bidder and BCCL and at the time of detailed engineering subject to owner's approval. The successful tenderer shall supply and / or erect any addition and modification as will be agreed upon in writing after mutual discussion.

3.10 The successful bidder shall supply and / or erect any addition or modification as will be agreed upon in writing after mutual discussion with the owner.

3.11 Discrepancies in Contract Documents & Adjustments thereof

3.11.1 The documents forming part of the contract are to be treated as mutually explanatory of one another and in case of discrepancy between schedule of quantity , the specifications and/or drawing, the following order of preference shall be observed :

- a) Description in Bill of Quantities of Work.
- b) Particular Specification & special Conditions, if any
- c) Drawings
- d) General Specifications
- e) BIS Specifications.

3.11.2 The event of varying or conflicting provision in any of the document(s) forming part of the contract, the Accepting Authority's decision/clarification shall hold good with regard to the intention of the document or contract as the case may be.

3.11.3 Any Error in description, quantity or rate in Bill of Quantities or any omission therefrom, shall not vitiate the contract or release the contractor from discharging his obligations under the contract including execution of work according to the Drawings and Specifications forming part of the particular contract document.

4.0 Details of works and services

4.1 Design Engineering

- i) Elaboration and furnishing of system design/ drawing, based on actual parameters of equipment to be supplied. The system design as proposed in the plant description shall form the basis of this elaboration.

- ii) Preparation and furnishing of all relevant detailed engineering drawings based on elaborated system design drawing duly approved by consultant in writing. This includes fabrication, assembly, installation and erection drawings.
- iii) Furnishing of detail design calculations in support of different design and equipment parameters.
- iv) Furnishing of equipment specification supported by manufacturer's illustrative pamphlets and literature.
- v) Furnishing of operational, maintenance and spare parts manual supported by the illustrative pamphlet and literature of manufacturers.
- VI) All approved drawings and documents shall be supplied in six copies in addition to one copy in ink on polyester tracing paper of approved quality and one copy on CD. Final drawing/literature shall be presented in the form of document.
- vii) All drawings shall comply with current Indian Standard specifications and shall be sufficiently detailed with dimensions and shall be clear and legible.
- viii) Necessary corrections will be carried out from time to time by the bidder in consultation with the representative of customer but within the overall limit of time as described in master NETWORK. All the activities of the contract will proceed on the line of approved PERT NETWORK.
- ix) The bidder shall submit detailed time schedule in the form of PERT NETWORK for complete plant and subsequently for each major activity for monitoring purpose. The same shall be updated from time to time. This is essential in view of maintaining time schedule. The successful bidder shall have to submit monthly/quarterly progress report of the various works being carried out.

4.2 **Erection and Commissioning**

4.2.1 Erection & commissioning of Rapid loading system, lift, fire-fighting system along with associated accessories and condition monitoring equipment .Erection and commissioning of dust suppression equipment, plant cleaning etc.

4.2.2 One no. 500 Te Wagon loading hopper with pre weigh-hopper consisting of hydraulic power pack, cylinders, guillotine type gates for high speed load out, load cells, wagon loading telescopic chute, OHE system within the loading area as per RDSO guideline No. TI/MI/0044 (09/2017) Rev-1 dated 18.9.17, etc

Matching infeed belt conveyor (NOT IN THE SCOPE OF THIS TENDER) shall feed the 500 tonne concrete hopper.

Responsibility of matching dispatch system (under this tender document) with incoming feed conveyor (within scope of BOMO) lies with the successful bidder of this tender. Any clarification, if

required may be discussed by the successful bidder of this tender. Design of hopper should be done in such a way so that it is suitable for the orientation & load data of the incoming feed conveyor. For orientation, load data, etc. of the incoming feed conveyor, the successful bidder should discuss with BCCL and BOMO. Any other clarification, if required, may be discussed by the successful bidder with BCCL and BOMO for finalization. Conveyors, Loading chute, lifting equipment of discharge drum/assembly are not in the scope of this tender. Adequate design provisions shall be made considering the thrust/forces arising out of running of belt conveyor system.

4.2.3 Rapid Loading system

The loading will be done through Rapid loading system on an average one wagon per minute. The loading shall be controlled from control room. OHE system shall be installed below the hopper for loading of rake with electric loco.

The average rate of loading shall match the creep speed of locomotive (0.8 to 1.2km/hr).

The rakes will be hauled by a creep controlled locomotive at 0.8 km/hr-1.2 Km/hr. Level indicators will be provided in the loading hopper to show the coal level position. The system shall have interlocking with indeed conveyor for emergency stop, in case of over filling of hopper. A lift has also been envisaged. To ensure better loading and weighing accuracy pre-weigh loading system shall be adopted. There shall be one loading pocket over the rail track.

4.2.4 The dovetailing of the loading point with the incoming conveyor from the washery shall be in the scope of the contract.

4.2.5 Pollution control

Dust suppression

Proper water supply arrangement for dust suppression will be made at dust generating points so that all working space remains free of dust. At Wagon loading hopper top and wagon loading point fog type dust suppression system has been envisaged as detailed elsewhere. All civil works pertaining to dust suppression shall be as per system requirement. Dust suppression system should be suitable for water which is available at Patherdih Washery. The pumping sets for the dust suppression /control should have 100% stand - by at each location.

Necessary measures shall be taken to keep noise and vibration level within permissive limits as per CPCB norms.

4.2.6 Repair facilities

Necessary spot repair facilities shall be provided for plant and equipment including lifting tools and tackles. Provision for site storage of spares and tools shall also be made. All lubrication charging points shall be dust free.

4.2.7 Drinking water and other facilities

Facilities for distribution of drinking water shall be provided along the plant with provision of toilet facilities at suitable points as detailed in civil section.

4.2.8 **Liners**

Liners shall be provided inside the hopper and weigh bin for smooth flow of coal as detailed elsewhere.

4.2.9 **Plant cleaning and drainage**

4.2.9.1 Suitable arrangements shall be made for cleaning of plant especially at the spillage point with the help of water hydrants and vacuum cleaners in case of electrical panels and plant equipment.

Plant cleaning points shall be provided at loading point. The effluent shall be discharged into a suitable location. Compressed air points should be provided in the different floors for cleaning. These shall be served by portable compressors as envisaged in the bid document.

Water and compressed air pipe line network along with connection /tapping points with control valves at suitable intervals shall be provided in the Wagon loading complex, sub-stations, etc. for pressure cleaning of floor, chutes, etc. Proper drainage arrangement will have to be made along the plant so that water or slush accumulation is avoided. At every probable spillage point suitable arrangement will have to be made for cleaning.

4.2.10 **Fire-fighting at Wagon loading complex**

Fire-fighting system shall comprise of (a) hydrant system, (b) mobile fire extinguishers as detailed elsewhere. Fire detection and alarm system shall also be provided.

Fire-fighting system shall be designed to meet the various requirements laid down in the fire protection manual by the Tariff Advisory Committee (TAC), India and National Fire Alarm Code by NFPA (USA). Components of the fire-fighting system shall be as per the relevant Indian/International (FM/UL) standards, as applicable.

Hydrant system: The design and installation of the system shall comply with the regulation as per TAC manual and shall consist of a network of over ground piping feeding pressurized water to a number of double headed hydrant valves located at wagon loading complex.

Portable & Mobile Extinguishers: Portable extinguishers of carbon dioxide type, dry powder type & soda acid/DCP type shall be installed at suitable locations as per TAC manual. Mobile extinguishers of required number shall be provided. Different types, as described above, shall conform to the latest BIS standards.

Fire detection and alarm annunciation system: The fire detection system shall be "Conventional wired type". Adequate numbers of combined heat & smoke detectors manual call point and sounders shall be provided in strategic location.

4.3 **ELECTRICAL**

The scope of work shall include design of electrical, control and communication systems for the entire plant, supply of equipment, erection, testing, commissioning and finally handing over the plant after commissioning satisfactorily.

The scope of work for the bidder shall start from receiving power from the old loading point sub-

station (CC bunker) of Patherdih old washery with supply and installation of all necessary switches and accessories there including metering arrangement.

Entire electrical system shall be complete to run the plant satisfactorily. They shall be conforming to Indian Electricity Rules 1956 & 2003(revised / with latest amendments) and latest version of all relevant Indian standards. Approval of Electrical inspection of state Government shall be obtained by the contractor along with submission of necessary test certificates / drawings / circuit diagrams etc.

The equipment shall be supplied as per the scope defined below and the Annexure ES-1 to ES-14.

Any equipment / sub-system specifically not covered in this document shall be deemed to be included to make system reliable, safe and complete for satisfactory operation and compliances of all Indian electricity rules / Indian standards.

The successful bidder shall supply and / or erect any addition or modification as will be agreed upon in writing after mutual discussion.

The proposed Loading point shall be located (as specified elsewhere in this document) near the loading point of Patherdih old washery and shall receive power at 415 volts from the old loading point sub-station (CC bunker) situated around 350 meters away by the side of railway track .

A new sub-station / switch station is to be built near the proposed loading point to cater power to all the electrical drives, illumination and control systems for the proposed plant. This sub-station shall receive power at 415 volts from the old Patherdih washery loading point sub-station. Power shall be received from the old Patherdihwashery loading point sub-station by installing two Nos. ACBs (to be supplied and installed by the bidder in the existing old sub-station with the necessary modification as required there) and two nos. of cable feeders (to be supplied and installed by the bidder) from there. Each of these two feeders shall have the capacity to supply entire power required for the proposed plant .

The new sub-station / switch station of the proposed loading point shall have separate MCC (Motor Control Centre) for distribution of power to all the electrical drives and illumination system of the proposed plant.

The proposed loading point shall have its own control room. The control room shall be so constructed to have full view of the loading operation. The scope of the system referred above shall broadly cover the following:

4.3.1 Power Receiving Arrangement

Power shall be received at 415 volts from old Patherdih washery loading point sub-station (CC Bunker) situated by the side of railway track approximately 350 meters away from the proposed plant. One No. 500 kVA 11000 / 415 volts transformer existing in this old sub-station (CC Bunker) shall be made available for the proposed plant. The bidder is to provide the secondary control ACB of this transformer with all necessary accessories and metering arrangement and cable feeder (buried underground) to the proposed plant .

An alternate source of power supply will also be made available from this sub-station (CC Bunker). For this purpose one more 415 volts ACB shall be provided by the bidder with all accessories and metering arrangement. This will be integrated with the existing system departmentally. From this ACB (to be supplied and installed by the bidder) one no. cable feeder (to be supplied and installed by the bidder) shall be drawn (buried underground) to the proposed plant which will serve as a second source of power for the proposed plant.

Each of these two cable feeders shall have sufficient capacity to supply entire power required for the proposed plant.

All the necessary works required for the above installations in the CC bunker sub-station shall be done by the bidder.

4.3.2 Power Distribution in the Plant

Supply and installation of LT Power Distribution Board / Motor Control Centre (MCC) shall be done at the sub-station / switch station to be built in the proposed site. From this sub-station / switch station power shall be distributed to all required equipment at 415 volts and illumination system with all necessary accessories and protective devices. Necessary power factor correction shall be made by providing capacitor banks of suitable rating with automatic power factor control panel. The Motor Control Centre (MCC) shall comprise the following:

Sl. No.	Description of MCC Modules	Feeder Type	Qty.
1.	415 V, ACB	Incoming Feeder and Bus coupler Cubicle	3 nos.
2.	415 V, MCCB cubicle	Outgoing feeder cubicle for control of Lighting transformer	2 nos.
3.	415 V, MCCB cubicle	Outgoing feeder cubicle for control of capacitor bank	2 nos.
4.	415 V, LT motor controlling cubicle comprising MCCBs, Isolator, HRC Fuses, Contactor, thermal Overload Relay with built in Single Phasing prevention.	Outgoing feeders for control of LT motors as indicated in the drawings	As required
5.	415 V, LT motor controlling cubicle comprising Isolator, HRC Fuses, Contactor, thermal Overload Relay with built in Single Phasing prevention	Spare Feeders	As required

Incoming and bus coupler ACBs shall be interlocked in such manner that the coupler ACB shall remain "OFF" when both the incoming ACBs will be "ON" and in the event of one of the incoming

ACB in “OFF” position, the coupler ACB will be “ON”.

Power Factor Improvement

For the purpose of improving power Factor to 0.98 (approx.) lagging and maintaining the same, suitably rated Capacitor Banks will be provided at 415 V. The capacitor banks will be complete with automatic power factor correction and switching devices which will facilitate for automatic selection and switching ON/OFF of the capacitor banks according to the load connected.

4.3.3 Illumination

Supply and installation of Lighting transformers and illumination system shall be done for the proposed plant , Railway siding and general area complete with all distribution boards , luminaries and fittings , poles , cables etc. with proper protective and control devices . The different areas of the proposed site shall be illuminated by sufficient nos. of proper lighting fixtures to have illumination levels as indicated below:

Area / Place	Illumination Level (Lux)	Types of lights
Area around hopper etc.	70	LED
Conveyor drive and discharge house, transfer points, maintenance bay, etc.	150	LED
Substation / MCC / Rear of control Panel / switch room / Office	150-300	LED
Control Room	250-300	LED
Area lighting (Lighting Mast)	50	LED

Two Nos. 100 kVA 415V / 230 V (L-L) lighting transformers shall be installed in the sub-station for the purpose of illumination. The distribution of power for illumination system shall be made through Lighting Distribution Boards located at strategic places as required. The two transformers shall remain so connected as to ensure reliability of lighting system and uninterrupted power supply to lighting load during outage of one transformer.

Emergency Illumination :

One No. DG set of 25 kVA capacity with automatic ON / OFF arrangement will be provided to facilitate power at strategic locations control rooms, different floors of loading point, staircases etc. at the time of power failure. For this, separate wiring with separate luminaries shall be provided. The emergency light points shall be provided at all strategic points.

In addition, inverter emergency light shall be provided in the switch room, control room and loading point .

4.3.4 Power and Control Cables

Supply and laying of power and control cables, cable trays and accessories shall be made as required

and as per Indian standards. Cables shall be laid underground wherever required following IE rules (Latest) , Indian standard code of practice.

4.3.5 Power Points

Supply and installation of power points shall be made at different locations for the purpose of utilisation of hand lamps , machine tools etc. for maintenance work at site.

4.3.6 Welding Sockets

For easy maintenance of entire plant, centralised welding circuit shall be provided. In such system, there shall be provision for installation of welding machine (welding transformer) for all area of the plant . For supply of power to welding machines, necessary circuit with plug and socket system of suitable capacity at an interval of not exceeding 50 m shall be laid by the bidder. This system shall facilitate connecting of welding lead at any point of plant for welding / repair of steel structures. Welding sockets shall be provided at convenient places as required. Supply of two numbers of portable welding transformers with all accessories as required shall be in the scope of work of bidder.

4.3.7 Communication system

The following communication system shall be provided for effective communication within the plant and also with BCCL authority.

Suitable nos. of automatic dial type telephone sets shall be provided at various locations of the plant. These telephone sets shall be wired and brought to common junction box in the plant and will be connected to the main auto exchange of the Owner / BCCL to make it an integrated communication system. Automatic dial type telephone sets shall be located in the following places:

- a)Sub-station / MCC room - 1 no.
- b)Room of Engineer In-charge - 1 no.
- c)Control room - 1 no.
- d)Maintenance / testing room - 1 no.
- e)Near Hopper - 1 no.
- f) Site office - 1 no.
- g)Loading control room - 1 no.
- h)Additional telephone sets, if required shall be provided to meet the operational requirement.

Industrial type duplex loud hailing plant inter-communication system shall also be provided in addition. Each loud hailer shall also have a hand set to facilitate private conversation. When hand set shall be used for communication, the loud speakers shall be disabled. Loud hailing system shall be provided at following locations:

- i) Hopper complex
- ii) Lift.

- iii) Substation & control room.
- iv) Engineer In-charge room and supervisor's room.
- v) Maintenance cum test room.
- vi) Store rooms.
- vii) Site office.
- viii) Fire-fighting pump house.

4.3.8 Earthing system

The earthing system shall strictly conform to the Indian Electricity Rules 1956 as amended up-to-date and IS-3043 . Earth pits shall be constructed as per requirement. Main earthing grid shall be provided around the periphery of substation and loading system for interconnection of grids of the buildings as well as to earth all the electrical equipment .

Each motor, transformer, 415V MCC, control and relay panels, lighting panels, receptacles, push button stations, junction boxes and other electrical equipment should be earthed by two separate earthing strips. In addition all the motors will be earthed through the armouring of the connecting cable. Size of earthing strip and electrodes shall be as per requirement of relevant IS. Main earth grid shall be of 40mm dia MS rods and bus strips of not be less than 65 mm x 8 mm whereas that of the connecting earthing strip shall not be less than 25 mm x 6 mm.

Hopper structure, cable tray supports, cable trays etc. shall not be considered as earthing conductors. Metallic sheath, screens / shields and armour of all cables shall be earthed at both the ends at the equipment where the cables are terminated. Suitable earthing clips shall be provided as required.

Cable trays shall be earthed at every 10 m intervals. Adequate care shall be taken towards earthing of light-fittings, welding sockets etc.

Separate earth pits for earthing of neutral of transformers and lightning arrestors shall be provided. All joints and connections of earth lead shall be welded / bolted securely.

The resistance to earth as measured shall not exceed 1 ohm. Test pits shall be provided at all interconnecting grid connections. Interconnection with employer's earth grid if any shall be made at least at two points by using test electrodes. There shall be a provision for soil resistivity to be measured.

4.3.9 Lightning Protection system

Lightning protection against direct strokes shall be provided for all structures, buildings, Hopper, Lift etc. having a height of 15 m or more. The lightning protection shall conform to IS 2309. Earthing system for lightning protection shall be independent of the earthing system for electrical equipment. It may be noted that the area designated for the plant including the neighboring area of the site is heavily lightning prone zone.

4.3.10 Plant Monitoring and Control system

In order to have better supervision, operation and control of the plant, microprocessor based programmable logic controllers (PLC) with back-up shall be envisaged for loading arrangement, one for normal operation and one as standby suitable for industrial control system. Automatic change over between the main and Hot Standby PLCs shall be envisaged. The PLCs shall have the facilities for remote monitoring and sequential control, including local operation of individual equipment, audio and visual fault annunciation, normal status display, signaling, data logging, data display and printing etc. It is being presumed that PLC of RLS is included in the Rapid Loading System Lot, supplied by the Bidder.

Dovetailing of hopper in-feed conveyor with level indicators shall be included.

General System Requirement

The system / equipment shall be capable of working satisfactorily to the guaranteed performance under dust laden atmospheric conditions having an ambient temperature of surrounding up to 50⁰ C and relative humidity up to 97%. The system design shall be such that in case of addition / modification of various equipment in the plant, the system can be extended easily for monitoring and control of additional equipment. The software shall have the provision for reconfiguration at site to accommodate the modification of the system.

The system shall have the following facilities:

- a) Real time automatic centralized control from control room for all the equipment for normal operation of the plant so as to ensure safe and efficient operation of entire plant.
- b) Stopping of any equipment from the control station located near the drive of respective equipment under all conditions including emergency.
- c) Starting and stopping of any desired equipment independently from local control stations located near the respective motors / drives for maintenance / repair / testing by selecting remote / local mode of operation from the control room through a suitable command wherever required.
- d) Sounding audio alarm / warning system prior to starting of the plant for information to plant personnel / maintenance staff to keep a safe distance from equipment under operation.
- e) Continuous status monitoring of all equipment in addition to status monitoring, monitoring of parameters like overload, single phasing, earth leakage, lubrication system, noise level, vibrations level of loading system, etc.
- f) Colour visual display units with functional key boards to allow the operator in control room to observe status of operation of various equipment, alarms, fault annunciation mimic display on VDUs and to select the various displays on VDUs pertaining to inspection of state of readiness of control circuits prior to equipment to be started. Besides VDU hardware mimic panel and annunciation panel shall also be envisaged in the control room along with the control desk.
- g) Dedicated keys on key board to select Remote / Local modes of operation and issue commands for starting / stopping drives in sequential / individual mode.
- h) Management information reports.

- i) Starting / stopping of Equipment which is not under sequence control from the site.
- j) Interlocking between feeding conveyor of the hopper and level indicator in hopper for automatic ON / OFF of feeding conveyor.

Remote & Sequence Control:

Following operations shall be envisaged for remote and sequence control:

- a) Inspection:

In case of sequence operation an inspection facility shall be provided in the circuit to check before actual starting that all the technological mechanisms are interlocked at the starting moment. This can be ascertained by key-board function which affects the pilot display in the circuit (to be displayed in VDU).

- b) Signaling:

The strategic points of the plant shall be equipped with two way Audio-visual signalling. This will ensure rapid and reliable communication between the strategic points and the operator in the control room for safe working as well as during emergency. Signal lamps and alarm bells for the operation of signal circuit are to be installed at the control room and at all the strategic points. There shall be bidirectional audio visual signaling system between train loading system and washery output conveyor with complete interlocking.

- c) Ready: The plant shall be ready to start by a key-board function with luminous head starts blinking indicating that the system is ready for starting.

- d) Alarm : When blinking of luminous head becomes steady, the operation of alarm system starts. The hooters connected with the Alarm system shall be suitably located in the plant to provide adequate warning to all the persons around the site.

The hooters shall keep on running until the whole plant comes into operation. The hooters in the alarm circuit shall be situated at all the strategic points and shall be controlled from the control room.

- e) Start:

After actual time of starting the hooters, the start function will commence blinking for the specified time. The operator shall operate the start function within the specific time, so that the plant may start, otherwise the cycle will have to be repeated. Gradually, all the indications of individual drives shall start glowing on the mimic one by one showing that the plant is running.

- f) Stop:

Normal stop:

Under normal conditions of sequence control, the stopping of the plant shall be affected from the control desk at control Room by a key board function. The stopping shall be made in sequence with a definite time lag in the direction of coal flow.

Emergency Stop:

Emergency stoppage may be caused by:

- i) The depression of emergency stop key on the key-board in the control desk in the control room.
- ii) The depression of emergency push button from any of local control stations at site and at some additional locations as required.

Any emergency cut out of any of the drives in a flow will cause an immediate switching off all the drives in the flow line.

In the event of emergency stoppage a siren will start giving warning distress sound to attract the attention of personnel working in the plant. The siren shall keep on blowing till acknowledged from respective control room.

- g) Automatic stop on fault :

In the event of stoppage of an equipment due to electrical fault such as over load, single phasing and mechanical fault, all the equipment in the stream will stop immediately.

- h) Local Control:

The local control system shall have the facility to remote operation and interlocking of a particular flow from the respective control desk so that individual equipment in a flow can be operated from the site by means of Local Control Station (LCS) installed near the respective equipment. This provision shall facilitate inspection, maintenance and test run of the equipment whenever required

A key board function shall be provided on respective key-boards with suitable locking arrangement for transfer of operation in local mode. Similarly, in each LCS a two position remote-local rotary switch (lockable in both positions) shall be provided. This selector switch on each LCS shall be interlocked with the keyboard function in such a way that,

- a) Unless all the selector switches of LCS in a particular flow line and selector switch on particular CCD are not on 'Remote' mode, the remote and sequence operations from control room is not possible and
- b) Unless the selector switch of the particular equipment in a flow is not in local mode and local operation function is not effected from control room, the local operation of individual equipment from site is not possible

A yellow indicating lamp shall be there with each LCS which shall glow when the local operation function is effected from respective control room.

Supply and installation of PLC based necessary automatic control system with all accessories for remote sequential and also Local Control stations for manual operation of the plant as mentioned below.

1. Flood Loading of UNIT TRAIN WAGONS:

For operation of wagon loading chute gate and gates of the pre weigh hopper, loading control console (LCC) shall be provided at suitable location so that the wagon loading operation can be viewed simultaneously while loading operations is in progress.

Loading of Unit train rakes shall be done from the flood loading chute along with its associated gates system through LCC. To warn the engine driver and concerned loading operator for loading of the unit train , necessary visual indication shall also be provided for the flood loading chute (at suitable locations) and on the loading control console (LCC) . The loading chute will be also interlocked with flood loading gate for its logical operation.

2. Control System for Flood Loading of UNIT TRAIN WAGONS:

Control system for flood loading system will be microprocessor based. This will include weigh sensing elements with associated power supply / amplifier, loading control console (LCC) display with key board and a printer. The system shall be used to enter set point for weigh hoppers, wagon identification numbers and weight of each car of unit train for visual check for correct feed into the system. In addition, it shall give the operator a visual indication of what is happening during loading operation.

3. Operation of Hopper Outlet Gates and Flood Loading Chute:

Operation of the chutes shall be hydraulic controlled from the loading control console (LCC) located in the control room.

All equipment shall be electrically / mechanically interlocked to ensure starting and stopping of their drives in a sequence or as required for logical operation of the system and adequate time lag will be provided to avoid overloading of the electric/hydraulic system.

The control console (LCC) with VDU display and Laser printer shall be designed to mount in front of the control room windows so that the operator can have full view of the loading operation. These shall have all pertinent control devices and visual indicators.

The console shall generally house the following switches / push buttons required for complete loading operation :-

- i) Auto manual-Emergency Manual mode selector switch for selecting types of loading systems.
- ii) Close-hold –open control switch for Hopper outlet gates.
- iii) Flood loading chute- loading and traverse position control switch.
- iv) Flood loading chute Raise-Hold-Low-traverse position control switch
- v) Open-Hold-Closed control switch for flood loading gate for Manual operation.
- vi) Automatic feed cut-off control with weigh hopper weight set point adjustment selector switch.
- vii) Weigh cycle start push button.
- viii) Weigh cycle stop push button.
- ix) Test weight Raise-Hold-Lower position selector switch.

- x) Control power ON / OFF switch
- xi) Hydraulic power start push button
- xii) Hydraulic power stop push button
- xiii) Alarm push button
- xiv) Skip next wagon push button

In addition to the above mentioned switches / push buttons the control console shall also house visual indicators / lamps to show the following:

- i) Hopper outlet gates 100% open, 75% open, 50%, 25% open and closed for precision feed cut-off
- ii) Hopper outlet gates open and closed for the other pair of gates.
- iii) Control supply on.
- iv) High- Intermediate- Low level of coal in the Hopper.
- v) Weight of coal in weigh hopper has reached the pre-set value.
- vi) Flood loading gates open and closed.
- vii) Flood loading chutes in loading position.
- viii) Flood loading chutes in retracted / traversed position.
- ix) Flood loading chutes in extended position.
- x) Test weights on.
- xi) Unit train in.
- xii) Wagon in position
- xiii) Panel clock with date.
- xiv) Net weight of coal loaded .

Traffic Control Consoles (TCC)

Microprocessor based Traffic Control Console (TCC) along with photo sensing devices (at required points) shall be provided in Traffic Control Operator's room (TCO) for controlling the movement of trains .

The Master Signal Post (MSP) shall be located at the traffic entry point, and its display shall be automatically controlled. There shall be provision so that automatic signalling may be overridden by manual operation initiated by the traffic control operator (TCO) from his room. The incoming train shall be clearly visible from TCO's room.

Display of MSP shall be repeated in TCO's control console in traffic control room.

4.3.11 UPS System

Supply and installation of UPSs of sufficient capacity with redundancy shall be made for necessary back up power supply to the plant. Backup Time should be minimum half hour.

Battery powered back up shall be provided for the system to enable the control system, microprocessor etc. to operate even during the power failure.

4.3.12 CONTROL CIRCUITS / CONTROL VOLTAGES:

Supply voltage of Auxiliary Control circuit & Contactor Coil of MCC shall be 110 V AC. 110 V AC shall be made available from control Transformer (1 operating and 1 standby) of required capacity to be installed in the MCC by the bidder.

For PLC based control system, power supply to PLC unit including relays shall be provided from 415 V / 110V transformer, 415 V / 220 V transformer and inverter unit as required. Power supply to PLC shall also be made available from the UPS provided.

Supply voltage of Programmable Logic Control Circuit shall be 24 V DC.

24 V DC shall be made available from UPS system.

4.3.13 COMPUTER FOR THE OFFICE OF ENGINEER IN-CHARGE:

2 Nos. PCs of latest model with Laser printers shall be provided for the office of Officer / Engineer In-charge and control room. In addition a laptop shall be provided. The computers shall be complete with necessary software packages for operation of PLC.

Desktop PCs should be complete with UPS of minimum 30 minutes back up.

4.3.14 AIR CONDITIONING AND PRESSURISATION SYSTEM

Supply and installation of Air conditioning system will be made in the control room .

Split type air conditioners of 1.5 Te / 2 Te capacity as per requirement should be provided at engineer-in-charge's rooms , maintenance cum testing room, Control room, PLC room.

Switch room shall be pressurized with conditioning of inlet air and control of humidity for proper operation of equipment and comfortable working of personnel inside the room. The number of air changes shall not be less than 15 per hour. The room shall have double door.

The design and construction of all rooms of sub-station shall be such that it shall be possible to prevent entry of dust and at the same time maintaining the proper temperature inside for proper working of the equipment and the personnel. Sufficient numbers of ceiling fans and exhaust fans shall be provided wherever required.

4.3.15 SELECTION OF EQUIPMENT

All electrical equipment design , supply , installation , testing and commissioning shall conform to Indian Electricity Rules and all relevant Indian Standard specifications and enclosed Annexure ES-1 to ES-14 .

The equipment shall be rated for continuous operation and suitable for heavy coal dust laden atmosphere with an ambient temperature of 50⁰C and 97 % humidity . The equipment shall be suitable for operation with the following system particulars :

Utilisation Voltage :	415 volts for motors
	230 volts (L-L) for illumination
Frequency :	50 Hz

Phase :	3 (Three)
Neutral :	Solidly earthed
Fault level :	31 MVA at 415 V.
Voltage variation :	± 10 %
Frequency variation :	± 3 %
Control voltage :	110 Volts AC and 220 V DC
	24 V DC for PLC

4.3.16 List of equipment (Tentative): Refer Annexure-III.2

4.3.17 Completeness of Offer:

The details given in the write-up / specifications (including drawings) in respect of electrical system / equipment are indicative only, not exhaustive. The electrical system / equipment shall co-ordinate with mechanical system / equipment of the plant.

If any electrical component or equipment with associated system is considered necessary and desirable as per Indian Electricity Rules amended up to date, or if the same is considered necessary and desirable to comply with the up-to-date engineering practices or with various Indian codes of Practices issued by the I.S.I. New Delhi from time to time the same shall be deemed to be a requirement of this tender specifications and same should consequently be included in the offer notwithstanding the fact that such requirements are not clearly or specifically indicated in these specifications along with the associated drawings.

All the equipment attachments, required for the execution of works as per scope of work as envisaged in the document shall be designed, fabricated erected and maintained for efficient and satisfactory performance, and the bidder shall be solely responsible for the same and the same shall be deemed to be within the scope of the offer / work whether specifically mentioned or not in these documents and the bidder shall not be eligible for any extra claim on this issue.

Annexure-III.1

LIST OF MECHANICAL EQUIPMENT AND ACCESSORIES

A: LIST OF EQUIPMENT

Sl.No.	Particulars	Capacity	Quantity (nos.)
1	Pre weigh Hopper	72 T	1
2	Rapid loading System	5500 tph	1 (refer specification)
3	Lift	1000 kg	1 (refer specification)
4	Electric Hoist	5 T	1
5	Dust Suppression /pollution control system		LS
6	Fire Fighting & Fire detection system		LS

7	Plant cleaning system		LS
8	OHE& its Installation as per RDSO guidelines no T1 /M1/0044 (09/2017) Rev-1 dated 18.9.2017 and latest amendment		LS
9	Items / accessories Not Specifically Mentioned But Needed for Successful Commissioning / Operation of the Plant.		As Required

B: LIST OF ACCESSORIES AND FACILITIES

Sl No.	Particulars	Quantity (nos.)
1	Continuous bin level indicator (High- Intermediate- Low level in coal hopper)	1 Set in loading hopper
2	Gas cutting set	1
3	Portable welding set	1 lot
4	Portable compressor for plant cleaning 30 cfm capacity 6 kg/cm ² Pressure	1 lot
5	Special tools and tackles	As received along with the equipment supplied
6	Consumables for start up including first and second fill of lubricants	As required
7	Noise abatement measures to reduce noise level	As required
8	Measures to control vibration so as to keep its level within ISO limits	As required
9	Items /accessories not specifically mentioned but needed for successful commissioning/operation of the plant.	As required

Note :**The above quantity are minimum.** If required to be increased/decreased during detail design stage, it has to be increased/decreased to suit the system requirement. The capacity of Chain Pulley Block shall be at least 25% more than the heaviest assembly/ component to be lifted. At the same time, the rating of Chain pulley block shall be standardized to minimize inventory for maintenance and interchangeability.

Annexure-III.2

A: LIST OF ELECTRICAL EQUIPMENT AND ACCESSORIES

Sl.No.	Particulars	Qty.
1	415 volts ACB with necessary accessories and energy meter for installation in the old Patherdihwashery loading point sub-station (CC bunker)	2 sets.
2	415 volts Motor Control Centre at the proposed plant for power receipt and distribution to all electrical drives with all necessary control and protective devices	1 set
3	Control transformers of required capacity complete with voltage stabilizers, rectifier and all accessories.	2 Sets
4 (a)	Two nos. 100 kVA 415 / 230 volts (L-L) Lighting transformers, Lighting distribution boards, Lighting fixtures, lamps, poles, masts, lighting cables, etc. as required.	2 Sets
4 (b)	Lighting Distribution Boards, Lighting fixtures, lamps, poles, masts, etc.	1 Lot
4 (c)	Lighting Cables	1 Lot
5	Power supply arrangement for PLC including step down transformers , switches etc.	1 Lot
6	UPS system with redundancy complete with batteries, protective and measuring devices and other accessories.	1 set
7	Power receptacles as required	1 Lot
8	Communication system as required	1 set
9	Welding system including Welding Cables	1 Lot
10	Capacitor bank of suitable rating with APFC	2 sets
11	Air conditioners with voltage stabilisers as required	1 Lot
12	Equipment and accessories for Pressurization	1 Lot
13	Power cables of various sizes and grades as required	1 Lot
14	Control and Signaling Cables	1 lot
15	Câble trays / racks , câble trenches etc.	1 Lot
16	Earthing system complete with earth pits , earthing strips , conductors etc.	1 Lot
17	Lightning protection system for building and structures	1 Lot
18	Ceiling fans / Exhaust fans as required	1 Lot
19	DG Set of 25 kVA capacity for emergency lights	1 set
20	Miscellaneous items required for safety and maintenance works , insulating mats , gloves , portable telescopic ladder, furniture etc.	1 Lot
21	Any other item required for completion of entire electrical system but not specifically mentioned	1 Lot

SUB-SECTION : 4.3.2
SCOPE OF WORKS
(CIVIL)

4.3 CIVIL AND STRUCTURAL WORKS

4.3.1 GENERAL

The scope of work under this contract shall include design, construction and successfully commissioning of all civil and structural works, supply of detailed survey drawing showing contour, geo-technical investigation including the supply of geo-technical report, supply of detailed design, working drawings including all relevant calculations and all necessary works as may be needed for testing and commissioning, elimination of all teething trouble, performance test and handing over of the plant as envisaged in detailed scope of work and system description. The necessary construction, erection, commissioning equipment related to civil engineering works shall be provided and transported to the site of work by the contractor. Due consideration shall be given for economy, architecture and functional utilities. This is a contract for purchase of complete installation including planning and design, manufacture, execution, supply, erection of civil & structural work. Accordingly, all works needed for successful completion and operation of the plant shall be covered in the Scope of work whether specifically mentioned here or not.

Adherence to Indian Standards

All the works including designs, drawings, construction, fabrication, testing, erection, etc. shall be done strictly as per relevant BIS Code of Practices. Wherever no Indian Standard is available, British, American, German, Soviet or other international standards may be used only as per its applicability and justification.

4.3.2 Basic scope

The scope of work covers all the related civil and structural works, detail designing of the same and successful commissioning of the civil and structural works for handing over the plant. This shall inter-alia, include the following:

4.3.2.1 Design & engineering of all civil and structural works of the plant.

4.3.2.2 Execution of all civil/structural works consisting of the following:

- a) Detailed survey of site including contour map preparation.
- b) All the geo-technical investigation required for the work including furnishing the geo-technical report, Collection of hydrological, blasting and rainfall data including any other data related to design and execution.
- c) Preparation of construction site.
- d) Supply of fabricated structural steelwork and shaped re-bars as required.
- e) Supply of all civil construction materials and other materials required.
- f) Execution of all civil works.
- g) Fabrication/erection of structural.

- h) All civil and structural works required for housing and installation of equipment and accessories under supply.
- i) Excavation/ construction/ erection/ installation and commissioning of all auxiliary services such as sanitary, drainage, roads, retaining walls, pavements, office and service buildings, lighting towers, landscaping/ grading/ leveling/fencing/site clearing as detailed elsewhere.
- j) Transportation of all construction materials to site, whether procured within the country or from other countries.
- k) Water supply arrangement for potable, industrial and fire fighting purposes.
- l) Drainage and sewage treatment (for domestic and industrial sewage) including its dovetailing with the existing system.
- m) Fire fighting arrangement.
- n) Roads, pavements, retaining walls, culverts, etc.
- o) All the protective measures for proper drainage for safety of structures, against ingress of water / seepage due to seasonal nallahs and its tributaries which are flowing through the construction site area as per actual site conditions and requirement.
- p) All the protective measures for safety of men and materials during construction against rail/dumper movements on existing railway tracks/haul roads.

4.3.2.3 Erection and commissioning of all the plants and equipments.

4.3.2.4 Inspection and testing.

4.3.2.5 Performance guarantee.

4.3.2.6 Perception and remedial measures for the safety of entire CHP area under the scope keeping in view the adjoining natural and artificial features such as hill slopes, nallah, buildings, etc.

4.3.2.7 Any other works/services not mentioned but required for the completion and commissioning of the plant.

4.3.3 DESIGN /ENGINEERING

4.3.3.1 Design Criteria

All detailed design and working drawings will be developed with proper co-ordination and inter-relation with mechanical and electrical equipment. The design of RCC structure shall be carried out in general as per code of practice of plain and reinforced concrete for general buildings construction BIS 456-2000 and other relevant standards including up-to-date amendments. The steel structure shall be designed and fabricated as per Code of practice for use of structural steel in general building

construction BIS 800 (latest edition) with up to date amendments and other relevant IS standards. The building/structure shall conform to local by-laws, rules and regulations for industrial buildings and as per relevant Indian Standards. Latest codes of practice with amendments up to date shall be strictly followed. In the absence of BIS codes, British standards Institution or the approved international codes could be considered for design as per its applicability and justification.

The bidder shall be responsible for and shall pay for any alterations of the work due to any discrepancies, errors or omissions in the design and drawings or other particulars supplied by him, whether such design, drawings or other particulars have been approved by customer or not.

4.3.3.2 Load consideration

Loads to be considered in design shall be as per relevant BIS codes of practices. Generally, in design the effect of dead loads, live loads, load due to impact, vibration, erection, wind load, seismic loads, dust load and load due to surcharge and moving vehicles, effect of blasting etc. wherever applicable shall be considered. The loads due to equipment shall be supplied by the bidders. In general, live load, wind loads, etc shall be as per BIS-875 (latest edition). Seismic loads to be considered in design shall be as per BIS 1893 (latest edition). The maximum bulk density of coal will be taken as 1.15 Te/m³ for load design calculation in respect of coal retaining structures. However, this is to be verified through lab test and reports to be submitted by the bidder before approval of drawings. Effect due to blasting is to be considered while designing the structures, as per the provision of BIS: 6922 with latest revision.

4.3.3.3 The topography factor for the calculation of design wind pressure shall be calculated as per BIS-875 read with the latest amendment.

4.3.3.4 Analysis & Design

All RCC and steel structure shall be designed in accordance with relevant IS Codes of practice of latest revision. In the analysis of structures, the worst loading combination of belt pulls, equipment loads, their impact, wind/seismic loads/blasting effect, coal and other loads as envisaged shall be considered.

4.3.3.5 Design drawing & detailed engineering

Broadly all the dimensions as given in NIT drawings are to be followed for bidding purpose. These dimensions are indicative & may require changes during detail design.

Preparation :

All the drawings shall be prepared in accordance with the provision of latest Indian Standards. All drawings shall be sufficiently detailed and dimensioned to help in speedy construction, fabrication and erection of structures. Wherever, any structure is presented in more than one sheet of drawings, same scale and notations shall be used in all the sheets for linking the drawings with each other. All

modifications made in structure during various stages of construction should be duly incorporated in working drawings.

Bar bending schedule, detailed material list and specification of works shall be prepared / detailed. Working drawing shall also include general arrangement drawings showing plans at different levels with sectional elevations. Separate detailed drawing shall be prepared for inserts and anchor bolts including their fixing details. The design drawings associated with steel structure should show the force in the members, complete details of all members, joints, gusset plates, welding, riveting, bolting, etc. The drawings should also show the weight of each assembly/sub-assembly as far as possible. In addition to design drawings, fabrication drawings shall also be prepared, showing item-wise details, erection units, materials list, details of fasteners with assembly, etc.

4.3.3.6 Submission of Design/Drawings

The contractor shall submit Geo-technical report, all the relevant detail design calculations, general arrangement/detail drawings, bar bending schedule, detailed material lists, specification of works including contour plan for approval of owner / consultant on standard size sheet.

Scrutiny and approval of drawings may be carried out through the consultant engaged by owner. All design details and drawings shall be submitted for approval of the following:

General Arrangement Drawings

Detail design calculations

All detail civil/structural/fabrication drawings

Any other drawings relevant for execution/fabrication of civil/structural works

Contractor shall submit for approval six sets of drawings along with detailed design calculations including analysis of force/stress in the structure along with the source from where data, except BIS codes, have been taken. Photocopies of such data should be submitted along with the design.

4.3.3.7 Procedure of Approval of drawings

The Owner shall have the final say in the approval of drawings. Drawings so submitted will become the property of the Owner. The approval of the drawings does not absolve the Contractor from the overall responsibility of the plant for its successful operation. The Contractor shall be responsible for and shall pay for any alterations of the work due to any discrepancy, errors or omissions in the drawings or particulars supplied by him, whether Owner has approved such drawings or other particulars.

Approval by Owner / Consultant

Design & drawing, submitted by the contractor, shall be scrutinised by owner/ consult. Out of six sets of drawing submitted to the owner, one copy will be sent to contractor after scrutiny with comments, modification or approval as the case may be. The contractor shall carry out the necessary rectification in drawings after discussion with owner in a reasonable time as agreed upon mutually and re-submit six copies of such revised drawings for approval of owner. Revised drawings shall then be scrutinised and approved if the comments made by the Owner are incorporated / taken care of. One copy of such drawing will be sent to the Contractor after approval.

4.3.3.8 As Built Drawings

Contractor shall make necessary correction / modification in the drawing as per actual work and shall prepare as built drawing. The Contractor shall supply such 8 (eight) sets of prints of as built drawing to the Owner along with one set of reproducible drawings on polyester paper in ink. The same will hold good for other documents also to be supplied by the Contractor under the heading of basic scope. All drawings should be prepared on AutoCAD in standard format and CD containing such drawing shall also be supplied along with hard prints.

4.3.4 PERT Network

After the issue of letter on Intent, the bidder will prepare a master plan PERT NETWORK incorporating all the major activities for the successful installation and commissioning of plant on turn key basis and submit it to customer for his approval and comments.

The detailed PERT NETWORK will be prepared for all major activities enlisted in the master PERT NETWORK. The detailed PERT NETWORK will be further discussed with customer and form the basis of monitoring of the project as a whole or activity wise. Necessary corrections will be carried out from time to time by the bidder in consultation with the representative of customer but within the overall limit of time as described in master NETWORK. All the activities of the contract will proceed on the line of approved PERT NETWORK.

4.3.5 Technical specifications

4.3.5.1 TECHNICAL SPECIFICATIONS FOR CIVIL WORKS

All workmanship, materials and work items shall confirm to relevant IS / BIS / MORTH / NBC STANDARDS. In case of items not adequately covered by above mentioned Indian Standards, the CPWD / NBO practices shall be followed:

4.3.5.2 Safety Measures FOR CIVIL WORKS

In respect of safety, Part – 7 Constructional Practices & Safety of National Building Code – 2005 shall be followed. All necessary safety measures to be adopted as recommended by relevant IS / BIS code to protect adjunct / nearby structure, workmen etc.

All works shall be carried out as per the item description and design & drawing supplied by the company, as per the relevant IS / BIS / NBC – 05 as per direction of the Engineer-in-Charge.

4.3.6 DETAILED SCOPE

4.3.6.1 General

The civil and structural work under, its scope shall cover all aspects of work, including soil and hydrological investigation, collection of rainfall data, detailed survey, preparation of preliminary drawings with proper co-ordination and inter relation with equipment, detailed design and preparation of the complete civil and structural working drawings, execution and erection of the complete civil and structural works, including roads and pavements, sanitation, water supply for industrial, drinking and fire fighting purpose besides water supply to various buildings and structure for dust suppression and extraction and cleaning as per system requirement and land development.

The execution of civil and structural work consist of providing all labour, supervision, materials, scaffolding, construction equipment, tools and plants, supply, transportation, and all incidental items not specified but implied for successful completion of the works in accordance with drawing and specification including any fee, tax, royalty as may be applicable in the work zone.

The nature of work shall generally involve chemical testing of construction water for corrosive action of chemical and other deleterious materials, earth work in filling and excavation in all types of soil and rock, dewatering, shoring, back filling around completed structures, disposal and form work, brick work fabrication and erection of structural/miscellaneous steel, inserts, anchor bolts, RCC/chequered plates trench covers, laying of water pipe lines, sewerage system, roads, surface and storm water drainage, ventilation related to the coal handling plant, damp proofing and other ancillary items.

The drawings as mentioned elsewhere in this contract document give a general idea about the work to be performed.

These are preliminary drawings for bidding purpose only and are by no means the final drawings showing the full range of the work under the scope. Work has to be executed according to approved working drawings, fabrications drawings with additions, alterations and modification made from time to time as required or approved by the customer.

4.3.6.2 Main components of loading point structure

The civil and structural works are related mainly to the following areas.

1. 1 Loading hopper

Loading Hopper (RCC) shall consist with all provision of civil and structural work for accommodating i) Control Room ii) Lift& Stair. This shall be designed and constructed as per system drawing.

4.3.6.2.2 Loading complex

a) Loading complex with one concrete hopper of 500 tonne capacity with 72 tonne pre attachment with telescopic chute for discharging coal to the wagon, elevator, staircase etc. shall be designed and constructed as per system requirement as shown in (E&M) system Drawing no.R2/E&M/300095, Rev-4. Adjacent to the loading hopper structure lift and staircase structure shall be constructed adjacent to the loading hopper structure as per the (E&M) system drawing.

b) Necessary loads that are likely to come due to the dovetailing shall be considered in the design of the loading point structure.

4.3.6.2.3 One sub-station structure to be constructed of RCC structure with the requisite area as per the system drawing.

4.3.6.2.4 Service Buildings

	Control Room	Plinth area 32 m ² (Minimum)
	Sub-Station –One number to be made	Plinth area 176 m ² (minimum)
	Lift and Stair room –one no.	Plinth area 36 m ² (minimum)

4.3.6.2.5 Road, Pavement should be made near the bunker structure as per I.S. Standard at the site as per requirement. The railway lines just below the loading point shall be covered with pavements. The road and the development area to be considered may be shown in the system drawings to avoid any ambiguity.

4.3.6.2.6 Drainage, sewerage system to be provided at the site as per requirement

4.3.6.2.7 Water supply arrangement including receiving, storage and distribution of water for fire fighting purposes - As per requirement. (Potable and industrial water shall be made available from the existing installation). One ground sump of 450 cum capacity shall be provided with necessary pump and pump house for this purpose.

4.3.6.2.8 Other Works and requirements

- i) Development works such as grading/leveling/dressing of the site etc.
- ii) Architectural requirements
- iii) Fire fighting and fire detection
- iv) Dust suppression and extraction

- v) Plant cleaning
- vi) Survey, Soil investigation and collection of rainfall and hydrological data
- vii) Earthwork in excavation
- viii) Construction, Fabrication, Erection and Commissioning
- ix) Inspection and testing
- x) Perception and remedial measures for safety and successful operation
- xi) Other miscellaneous works/services/requirements etc. as may be necessary for successful commissioning of the plant.

4.3.7DETAILS OF MAIN COMPONENTS AND OTHER MISCELLANEOUS WORKS.

4.3.7.1Loading Complex

The loading complex shall be as per E&M system drawing and shall include one concrete hopper of 500 tonne capacity with 72 tonne pre weigh hopper attachment with suitable chute for discharging coal to the wagon. The loading point structure shall be of reinforced cement concrete construction with concrete 500 tonne hopper with 72 tonne pre weigh hopper attachment, with suitable chute for discharging coal to the wagon,, control room staircase and lift.

The staircase and lift room shall be constructed of reinforced cement concrete construction.

The hopper shall be designed on mass flow condition so as to achieve the required loading rate without bridging, arching and rat holing inside the bunker Internal lining of the Bunker/Hopper shall be as given below :

a)	Hopper Wall portion (Conical Inside Wall)	10 mm thick stainless steel plate liners with 409 M grade steel.
b)	Hopper Wall (Vertical wall)	25 mm thick ferrosite lining

The plate liner shall be provided / fixed in such a way as to enable its replacement in case of wear.

Arrangements for installation of one number of pre-weigh hopper of 72 tonne capacity with suitable chute for discharging coal to the wagon has to be made.

There shall be sufficient areas of platforms and floors below hopper with proper accessibility and head room for inspection and maintenance of pre weigh hopper gates and its allied equipments.

The Hopper top platform shall be of RCC slab with necessary openings for the inflow of coal. Structures above this platform shall be of structural steel and will house the head drum, drive units etc. as elaborated in the system drawing.

There shall be sufficient areas of platforms and floors below the hopper with proper accessibility and head room for inspection and maintenance of pre-weigh hopper gates and its allied equipments.

The connection between 500 tonne concrete hopper openings and pre weigh hopper shall be adequately designed to avoid any slippage. Stainless steel or non corrosive bolts with nuts and washers shall be provided to connect the pre weigh hopper with bunker.

In addition, the design of hopper shall take care to prevalent guidelines of RDSO,as mentioned earlier, with reference to laying of OHE below the hopper.

All the facilities for maintenance, hoist, monorails etc. shall be provided as per system drawing alongwith necessary structure at the top of the hopper. Lifting equipment required for discharge drum/assembly shall be provided by BOM operator of washery. Any clarification, if required may be discussed by the successful bidder with BCCL and BOMO for finalization. All the necessary inserts shall have to be provided for fixing cables etc.

Scope of this work includes the complete design and construction of one concrete hopper of 500 tonne with 72 tonne pre weigh hopper attachment with suitable chute for discharging coal to the wagon up to top cover level and associated structures at the top. In this context, the tenderer shall investigate the soil condition at site of construction in detail at their own cost at the time of design/construction.

Control room will house electrical and control equipment including mimic panels for entire loading system including control console, CRT display and printer etc. It shall be provided with air conditioning facilities with provision of fully glazed aluminum double door and false ceiling. Fully glazed fixed panels in aluminium frame with toughened glass sheet shall be provided on the loading chute side for clear visibility of loading operations from control panel. All the internal surfaces of control rooms shall be finished with plastic emulsion paint of approved quality and shade or any other finish depending upon functional need. Suitable PVC flooring shall be provided.

Column and foundation sizes as shown in system drawings shall be clarified to avoid any confusion.

4.3.7.2 Service Buildings

4.3.7.2.1 General

All the buildings except otherwise mentioned below shall be of RCC framed structure construction plastered and finished with cement based paint outside. However, lighting tower may be of structural steel. The areas for the various service buildings to be provided shall be as given earlier. Plinth level of service buildings shall be 450 mm above final accepted graded level around the buildings. Steel doors, rolling shutters, collapsible gates and steel windows are to be fitted as per requirement. Steel windows shall be glazed with wired glass and suitable grills of square bar. All the buildings shall be given pre-construction anti-termite treatment. The floor shall be of terrazzo type or any other type depending on the functional requirement. The store floors shall be of 150 mm

thick RCC M25 grade of adequate thickness of sand filling and mud matting over the base course followed by 12 mm thick ironite / ferrosite topping. The floor of the battery room shall be anti-acidic. The battery room should be provided with exhaust fan to exhaust the fumes. The internal surfaces shall be finished with plastic emulsion paint of approved shade or of any other finish depending on functional need.

4.3.7.2.2 Toilet

Toilets shall be provided as per requirement. The facilities shall include water closet, urinals, wash basin, looking mirror, cistern, towel rail, glass shelf, flush doors etc. The skirting up to a height of 1.5 m shall be of glazed tiles. The floorings shall be mosaic.

4.3.7.2.3 Substation

The proposed Loading point shall be located (as specified elsewhere in this document) as mentioned in Drawing no. R2/E&M/300095, Rev-4.

A new sub-station with control room is to be built up near the proposed loading point to cater power to all the electrical drives, illumination and control systems for the proposed plant. This sub-station shall receive power at 415 volts from the Patherdihwashery loading point sub-station. The location of substation has been shown in the system drawing. The substation will have transformer rooms, MCC rooms, tool room, capacitor bank room, generator room, control room, Engineer-in-charge room, electrician room, etc. with toilet facilities. The flooring of the building will be as per the functional/safety requirement. The details of plastering, brick work, RCC work will be as per technical specification which has been mentioned elsewhere in this document. The details of equipment have been mentioned in the electrical sections of the document. The layout of the cable trench will be as per system requirement. The invert level of the cable trench shall be kept minimum 0.5 m above finished ground levels and the plinth of the building shall be fixed accordingly. The building shall be provided with RCC roof. There will be suitable arrangement for lifting the transformer in case of breakdown/maintenance for which suitable RCC paved platform shall be constructed at same level out side the substation building to facilitate handling of the transformer and other equipment. The scope covers construction of complete building with cable trench and foundation of the equipment in all respect.

Pressurisation in MCC rooms of sub-station shall be done. Air conditioning facilities shall be provided in all control/PLC rooms of sub-station. The entrance to both the MCC room, control room/PLC room shall have double doors suitably designed to prevent sudden pressure loss. The flooring in MCC room and switchgear room shall be of IPS with insulating rubber matting. Air required for pressurisation of MCC room shall be free of dust. For this, adequate arrangements for cleaning, filtering and treatment of air to maintain the desired humidity shall be included with scope of work. In case of Control and MCC rooms, the sound level within the rooms should be kept below 60db.

4.3.7.2.4 Drainage and Sewerage Arrangements

4.3.7.2.4.1 Drainage Arrangements

Proper surface drainage facilities of adequate dimensions, specifications and slope shall be provided for the entire proposed area to take care of all the storm water which is likely to be encountered considering the topography and the natural drainage of the construction sites and the adjoining area. Dimensions and specification of drains and cross drainage works shall be so engineered and constructed so as to receive and discharge all the storm water entering into the proposed plant area including run off from the area outside the proposed construction site which is likely to enter the proposed plant area. The storm water shall be disposed off to the nearest nallah or shall be taken to a suitable distance where it can be properly disposed. Drain shall be provided with suitably designed pre cast RCC covers/ culverts wherever necessary. All the drains shall be pucca drains.

4.3.7.2.5 Services

4.3.7.2.5.1 Industrial / fire fighting water

Water supply lines and arrangements shall be provided for fire fighting and dust suppression as explained elsewhere. Necessary pumping facilities shall also be provided.

All piping and pumping arrangement for drinking and including pump house for this purpose shall not be in the scope of this contract.

4.3.7.2.6 Other works/requirements

4.3.7.2.6.1 Survey, Soil investigation and Collection of rainfall and hydrological data

No data regarding above are made available in this tender document. The bidder is required to inspect and examine the site and its surroundings and satisfy himself as to the nature of ground, rainfall and the soil, the availability and suitability of other requirements, as required for fair bidding purposes. The successful bidder shall have to undertake detailed survey, detailed soil investigation and collection of hydrological data, rainfall data, prepare and submit a comprehensive soil report with recommendations for type of foundation, bearing capacities, method of deep excavation, probable settlement for foundations etc. for approval of the owner/consultant. Reports approved by the owner/consultant shall be finally adopted for design

and engineering. Soil investigation should be done in the presence of the owner/consultant. No extra claim shall be made over contract price for variation in soil, rainfall and hydrological investigation reports which may result in change of design and type of foundation unless otherwise stated. All works related to site survey shall be conducted as per standard practice and also as per system requirement.

4.3.7.2.6.2 Earthwork in excavation

Excavation of earth for all types of soil for construction of all the civil structures is covered in the scope of this contract. Final dressing of ground in and around the proposed area is under the scope of this contract for drainage will be done by the contractor as per technical and functional requirement. After completion of work ground will be provided in as it is condition. Excavation for proper drainage of rain/ subsoil water around the service buildings, Hopper site, control room, Lift & Stair houses, substations etc. is covered under the scope of this tender. The depth and size of the excavation will be as per approved system requirement and as per detail design drawings. All cuttings and fillings as per required level and profile including transportation/ disposal of soil within a distance of 2 km is included in the scope of this bid. If Blasting is required, the contractor has to prepare the site and carry out blast hole drilling as per the requirement. The contractor will be responsible for drilling in all gradients/ terrain as per requirement of the work.

Blasting if required, will be done departmentally by BCCL. However, the drilling pattern and blast design parameters are to be decided mutually by the technical representative of the contractor and the project officialsonday-to-day basis so as to avoid any dispute on fragmentation of rock and powder factor.

4.3.7.2.6.3 Development works such as Grading/leveling/dressing of site, etc

Site grading/leveling shall be done by the bidder within boundary limit of the proposed area under the scope of this contract based on detailed survey to be done by the bidder as per technical/functional and drainage requirement.

The HFL, Bed level, water flow, etc. of the existing water courses, sub-soil water table shall be taken into consideration while designing the structures. Bidder shall undertake various remedial measures for protection of the proposed Site of Hopper area from streams/water courses as per requirement.

4.3.7.2.6.4 Architectural requirements

The structures in the whole complex (under the scope of this contract) shall have appropriate industrial architectural look, with appropriate colour, shades and structural networks. All the structures should portray architectural excellence with due care to better utilisation of space, service requirements etc. and also encompass concerns as varied as contemporary design, area conservation and environmental issues. The buildings with brick work, concrete and plaster faces shall have cement based paints in aesthetically sound shades as approved and all steel structures

shall have oil based paints with louvers and openings for ventilation and better use.

4.3.7.2.6.5 Fire Fighting

Whole of the site shall be protected against fire. Automatic fire fighting facilities shall be provided as per relevant IS codes and TAC norms as discussed in Electrical and Mechanical chapter . Main protection system against fire shall be fire Hydrant/spray nozzle system and fire detection system. The mains shall be laid in rings wherever necessary. The type of pipe to be used for fire fighting and location of hydrants shall be as per IS 9668-1980. (latest revision). Hydrants/spray nozzle shall be provided at suitable intervals all along the proposed site as per technical requirement. Water tanks and pump house shall be included in the scope of work.

Fire fighting points/hydrants shall be provided for entire proposed hopper, sub-stations and service buildings etc. Fire hydrants shall be provided as per TAC recommendation in the entire plant. Necessary landing valves at all the floor of receiving pits, Hopper, sub-stations and at other places wherever necessary shall be provided.

The pressure of each hydrant shall not be less than 3.5 kg/sq. cm when up to four hydrants are used simultaneously.

4.3.7.2.6.6 Dust Suppression

Proper water supply arrangement for dust suppression will be made at dust generating points so that all working space remain free of dust. For dust suppression water jets will have to be provided in Hopper. All civil works pertaining to dust suppression shall be as per system requirement. The pumping sets for the dust suppression/control should have 100% stand by at each location.

4.3.7.2.6.7 Plant Cleaning

Water and compressed air pipe line net work along with connection/tapping points with control valves at suitable intervals shall be provided in the sub-stations, Hopper etc. for pressure cleaning of floor chutes, walkways etc. Proper drainage arrangement will have to be made all along the plant so that water or slush accumulation is avoided. At every probable spillage point suitable arrangement will have to be made for a mechanized or manual cleaning.

4.3.7.2.7 Construction, Fabrication, Erection and Commissioning, overheads and Supervision : will be done as per relevant standards.

4.3.7.2.8 Clearance of site before start of work

Site will be handed over to the contractor in 'as it is' condition. Any site preparation work including cleaning, cutting, filling, leveling, grading, removal, etc. before start of the actual work shall be done by the contractor to the full satisfaction of Engineer-in-charge.

4.3.7.2.9 Site Clearance after completion of work

After the completion of work the contractor shall remove scaffolding, sheds rubbish and surplus materials except which are required for rectification of defects. Contractor shall hand over the site

in clean and tidy condition after cleaning the total area including floor, drains etc. fit for the use by the owner.

4.3.7.2.10 Layout and Levels

The layout and levels of all structures, etc. shall be laid by the contractor at his own cost from the general grid of the plot and bench marks given by the Engineer-in-charge for checking the detailed layout and correctness of the layout and levels. But the contractor shall be solely responsible for correctness of layout and levels.

4.3.7.2.11 Specifications

The work shall be executed according to the relevant Indian Standard codes of practices given below or to the recommendations of relevant American and British Standard in cases where Indian Standard codes are not available for such works.

1. IS 269 : Ordinary Portland Cement For 33 Grade Cement
2. IS 8112 : For 43 Grade Cement
3. IS 12269 : For 53 Grade Cement
4. IS 455 : Portland Slag cement
5. IS 1489 : (Part-I & Part- II): Portland pozzolona Cement
6. IS 712 : Lime
7. IS 1624 : Field Tests to determine the quality of lime
8. IS 383 : Fine aggregate
9. IS 383 : Fine aggregate of Cement
10. IS 383 : Hard Stones
11. IS 432 : Mild Steel and medium Tensile Steel Bars and hard Drawn

Steel Wire

12. IS 1786 : High Strength Deformed steel bars and wires
13. IS 2062 : Structural Steel sections
14. IS 1077 : Bricks
15. IS 287 : Maximum Permissible Moisture
16. IS 2202 : Flush Doors
17. IS 1038 : Steel Windows , Doors and Ventilators
18. IS 1237 : Plain cement tiles ,chequered tiles , mosaic tiles , terrazzo tiles
19. IS 1237-1980 : Sizes of chips and proportion of chips to cement in terrazzo or mosaic floor
20. IS 277 : CGI sheets
21. IS 808 : Dimensions for hot rolled steel bars beams , channels and angle Sections
22. IS 2062 : Steel for general structural purposes – Specification

- 23. IS 1148 : Specification for hot rolled Rivet Bars (upto 40 mm diafor structural purpose .
- 24. IS 1363 Hexagonal head bolts , screws and nuts .
- 25 IS 814 : Specification for covered (part-I and part-II) Electrodes forMetal Arc welding of structural steel .
- 26 IS 816 : Code of practice for use of Metal Arc welding for general construction in mild steel
- 27. IS 800 : Code of practice for the use of structural steel in generalbuilding construction in steel
- 28. IS 817 : Code of practice for training and testing of metal arcwelding .
- 29. IS 1477 : Code of practice for painting of Ferrous metals in buildingand Allied finishes .
- 30. IS 961 : Structural high quality tensile bolts conforming to grade St-58-HT
- 31. IS 814 (Part-I) : Electrodes
- 32. IS 814 (Part- II): Welding Sheets

4.3.7.2.12 Construction method and equipment

The Contractor shall submit drawings and write ups indicating a broad outline of how he intends to execute the work.

4.3.7.2.13 Installation/erection and supervision

It will be the contractor's responsibility to bring, receive and keep the materials in safe custody in proper condition. Responsibility of handling the materials during manufacturing, transit and handling at site rests with the contractor. All the equipment will have to be installed and fitted with accessories as per approved drawing. Entire tools and tackles, manpower and any other material required for successful installation will be supplied by the contractor. The contractor shall furnish the list of requirement of engineers, supervisors and other skilled personnel to carry out the job properly.

4.3.7.2.14 Commissioning

After installation, including electrical civil/structural items, the individual equipment will be commissioned and put on no load trial run. Any defect noticed will have to be rectified/replaced at contractors cost. After commissioning all the equipment in the circuit individually on no load and having satisfied the consultant/customer, the entire circuit shall have to be put on load test and performance of individual equipments or its accessories or the circuit as whole will be observed closely by a joint team of engineer, drawn from consultant's side, customer's side and contractor's side. This test run on load will continue till the representatives of consultant or customer is fully satisfied with the performance. The entire arrangement of the trial run shall have to be made by the contractor at his own cost. The contractor has to give a sufficiently advanced intimation in this regard.

4.3.7.2.15 Performance guarantee

To perform load test for the plant for Performance Guarantee by successful contractor, customer shall provide washed coal/washed coal(power)only. Any excuse on the part of the contractor will not relieve him from the responsibilities of successful commissioning of plant to the best satisfaction of consultant/customer. To carry out the job of commissioning in the best possible way, the contractor shall have to co-ordinate with all concerned agencies such as designer, equipment manufacturers, consultant, customer, statutory bodies and other government or local bodies as per requirement.

4.3.7.2.16 Inspection and testing

All tests required for materials, quality of work and any other tests as required/desired by the Engineer-in-charge shall be at Contractor's cost. The frequency and mode of testing shall be as per latest relevant BIS codes.

The contractor will give a performance guarantee covering any loss due to faulty design, manufacturer, workmanship rated performance etc., including for bought out items at suite for a period of one year from the date of successful commissioning of the plant. The contractor shall replace all such defective equipment or part of the concerned installation free of cost. The loss of time on this account will automatically extend the performance guarantee period and same will be dealt as per the relevant clause of conditions of contract.

4.3.7.2.17 Perception and remedial measures

Perception and remedial measures for the entire area is under the scope of keeping in view the adjoining natural and artificial features such as hill slopes, nallah, buildings, hopper etc.

4.3.7.2.18 Miscellaneous works

All brick work, doors, windows, finishes including architectural treatment, plinth protection, water proofing, damp proofing, glazing etc.

1. All brickwork shall be carried out as per relevant IS codes and shall be plastered on both faces with 15mm thick cement mortar 1:6 (cement/sand). All external walls shall be of minimum 250 mm thick. RCC ceiling shall be plastered with 6 mm thick plaster. The scope also includes providing and fixing all doors, windows, rolling shutters, finishes, damp proofing, inserts, anchor bolts, embedment, stairs nosing, railings ladders, edge protection angle, etc. Doors and windows shall be of steel frames and suitably glazed. Openings on external walls of the buildings shall be provided with sunshades.

2. All equipment foundations.

3. All inserts, anchor bolts and embedment.

4. All railings, ladders and platforms.

5. All necessary wind ties
6. Cable trenches shall be provided with chequered plate or with pre-cast RCC covers. Cable trenches as well as pre-cast cover shall be provided with edge protection angles. All embedment/block cuts as required elsewhere in these specifications shall be provided, or cable tray can also be provided.
7. All external surface of underground concrete structure shall be given a bitumen coat. 600 mm thick boulder packing shall be provided on the outside face of earth retaining structures. Weep holes shall be provided at suitable spacing in all earth retaining structures as per design requirement.
8. All corners and edges in openings shall be protected with angle of minimum size 75 mm x 75 mm x 8 mm with suitable lugs embedded in concrete. Similarly all edges of concrete members coming in contact with flow of coal or any other moving material shall be provided with similar edging for protection.
9. Floodlight tower shall be provided wherever required. Monorail girders and fixtures shall be provided for monorails at locations as required and described elsewhere in these specifications or drawings.

All RCC work to be done under this specification unless specified, otherwise, shall be of controlled concrete of grade not less than M-25 of IS 456 (Latest) and shall be made with fresh cement.
10. All structural steel work shall have one shop coat and one site coat of red oxide zinc chromate and two field coats of synthetic enamel paints as specified elsewhere. However, bidders are to mention the thickness of painting in microns.
11. Gradient of the staircase should not exceed 40 degree and there should not be monkey ladders.
12. Any other works/services/requirements whether specifically indicated or not and found necessary to be incorporated on later date for safety and efficient operation of the plant shall also be deemed to have been covered within the scope of work of this tender.

4.3.8 Safety

4.3.8.1 Safety Code for Work in Hopper:

In addition to the general safety codes set out before special measures, methods of working and equipment shall be used in hopper. In particular the hopper shall be kept well ventilated and protective covers shall be placed over roof openings (other than those left open for properly installed and protected hoists) wherever work is in progress inside the hopper.

Only skilled and reliable workmen connected with the internal operations shall be allowed on the

hopper roof while internal work is in progress. No other personnel work whatsoever shall be allowed on the roof or the sides of the Hopper.

The contractor is to prepare a safety code of practice for these operation for approval by the purchaser

4.3.8.2 Safety Code – General

- i) Suitable scaffolds shall be provided for workmen for work that cannot safely be done from the ground or from solid construction except such short period work as can be done safely from ladders. When a ladder is used an extra mazdoor shall be engaged for holding the ladder and if the ladder is used for carrying materials as well, suitable foot holds and hand holds shall be provided on the ladder and the ladder shall be given an inclination not steeper than 1/4 horizontal to 1 vertical.
- ii) Scaffolding or staging more than 3.25 meters above the ground or floor, slung or suspended from an overhead support or erected with stationary support shall have a guard rail properly attached, bolted, braced and otherwise secured at least 1 meter high above the floor or platform of such scaffolding or staging and extending along the entire length of the outside and ends there of with only such opening as may be necessary for the delivery of materials. Such scaffolding or staging shall be so fastened as to prevent it from swaying from the building or structures.
- iii) Working platform, gangways and stairways shall be so constructed that they do not suddenly or unequally change level, and if height of a platform or gangway or stairway is more than 1.25 metre above ground level or floor level, it shall be closely boarded, have adequate width and be suitably fenced, as described above.
- iv) Every opening in floor of a building or in a working platform shall be provided with suitable means to prevent fall of persons or materials by providing suitable fencing or railing with a minimum height of 1 metre.
- v) Safe means of access shall be provided to all working platform and other working places. Every ladder shall be securely fixed. No portable single ladder shall be over 9 meters in length. Width between side rails in a rung ladder shall in no case be less than 30 cm for ladders up to and including 3 metres in length. For longer ladders this width shall be increased at least 6 mm for each additional 30 cm of length. Uniform step spacing shall not exceed 30 cm. All scaffolding, ladders and other safety devices mentioned or described herein, shall be maintained in safe condition and no scaffold, ladder or equipment shall be altered or removed while it is in use.
- vi) Adequate precautions shall be taken to prevent danger from electrical equipment. When

workers are employed on electrical installations which are already energised, insulating mats, working apparel such as gloves, sleeves and boots, as may be necessary shall be provided. Workers shall not wear any rings, watches and carry keys or other materials which are good conductors of electricity.

- vii) No materials on any of the sites shall be so stacked or placed as to cause danger of inconvenience to any person or the public.
- viii) The contractor shall provide all necessary fencing and lights to protect public from accident and shall be bound to bear expenses of defense of every suit action or other proceedings at law that neglect of the above precautions and so pay any damages and costs which may be awarded in any such suit, action or proceeding in such persons or which may with the consent of the contractor be paid to compromise any claim by any such person.
- ix) Excavation and Trenching - All trenches, 1.6 meters or more in depth, shall at all times be supplied with at least one ladder for each 20 meters in length or fraction thereof. Ladder shall be extended from bottom of trench to at least 1 meter above surface of the ground. Sides of a trench which is 1.5 meters or more in depth shall be stepped to give suitable slope or securely held by timber bracing, so as to avoid the danger of sides collapsing. Excavated materials shall not be placed within 1.5 meter of edge of trench or half of depth of trench, whichever is more. Cutting shall be done from top to bottom. Under no circumstances shall undermining or undercutting be done.
- x) Demolition - Before any demolition work, the contractor is to take permission from the owner (BCCL). During the process of the work, the following precautions have to be taken :
 - a) All roads and open areas adjacent to the work-site shall either be closed or suitably protected.
 - b) No electric cable or apparatus which is liable to be a source of danger over a cable or apparatus used by operator shall remain electrically charged.
 - c) All practical steps shall be taken to prevent danger to persons employed from risk of fire or explosion, or flooding. No floor, roof or other part of a building shall be so overloaded with debris or materials as to render it unsafe.
- xi) All necessary personnel safety equipment as considered adequate by the Engineer-in-charge shall be available for use of persons employed on the site and maintained in a condition suitable for immediate use, and the contractor shall take adequate steps to ensure proper use of equipment by these concerned.
 - a) Workers employed on mixing asphaltic materials, cement and lime mortar / concrete shall be provided with protective gloves.

- b) Those engaged in handling any materials which is injurious to eyes shall be provided with protective goggles.
 - c) Those engaged in welding works shall be provided with welder's protective eyes shield.
 - d) When workers are employed in sewers and manholes which are in use, the contractor shall ensure that manhole covers are opened and manholes are ventilated at least for an hour before workers are allowed to get into them. Manholes so opened are cordoned off with suitable railing and provided with warning signal or boards to prevent accident to public.
 - e) Stone breaker shall be provided with protective goggles and protective clothing and seated at sufficiently safe intervals.
- xii) The contractor shall not employ man below the age of 18 and women on the work of painting with products containing lead in any form. Whenever men above the age of 18 are employed on the work of lead painting, the following precautions shall be taken:
- a) Suitable face masks shall be supplied for use by workers when paint is applied in the form of spray or when a surface having lead paint is being dry rubbed and scraped.
 - b) Overalls shall be supplied by the contractor to workmen and adequate facilities shall be provided to enable working painters to wash during and on recession of work.
 - c) Overalls shall be supplied by the contractor to workmen and adequate facilities shall be provided to enable working painters to wash during and on recession of work.
- xiii) Use of hoisting machines and tackle including their attachments, anchorage and supports shall conform to the following:
- a) These shall be of good mechanical construction, sound materials and adequate strength and free from patent defects and shall be kept in good repair and in good working order. They shall be regularly tested and certified as appropriate.
 - b) Every rope used in hoisting or lowering material or as a means of suspension shall be of durable quality and adequate strength and free from patent defects.
 - c) Every crane driver of hoisting appliance/ operator shall be properly qualified and no person under the age of 21 years shall be in charge of any hoisting machine including any scaffold, winch or give signals to operator.
 - d) In case of every hoisting machine and of every chain ring hook, shackle swivel and pulley block used in hoisting or lowering or as means of sub-tension, safe working load shall be ascertained by adequate means. Every hoisting machine and all gear referred to above shall be plainly marked with safe working load. In case of a hoisting machine having a variable safe working load and the conditions under which it is applicable shall be clearly indicated.

No part of any machine or of any gear referred to above in this paragraph shall be loaded beyond safe working load except for the purpose of testing.

- e) In case of departmental machine, safe working load shall be notified by Engineer-in-charge. As regards contractor's machine, the contractor shall notify safe working load of each machine to the Engineer-in-charge wherever he brings it to site of work, and shall get it verified by the Engineer-in-charge.
- f) Motors, gearing, transmission, electric wiring and at near dangerous parts of hoisting appliance shall be provided with efficient safeguards.
- g) Hoisting appliances shall be provided with such means as will reduce to the minimum risk of accidental descent of load. Adequate precautions shall be taken to reduce to the minimum risk of any part of a suspended load becoming accidentally displaced.
- xiv) Adequate washing facilities shall be provided at or near places of work.

4.3.9 Application

These safety provisions shall be brought to the notice of all concerned by display on notice board at a permanent place at the work spot. Persons responsible for ensuring compliance with the safety code shall be named by the contractor. To ensure effective enforcement of the rules and regulations relating to safety precautions, arrangements made by the contractor shall be open to inspection by the Engineer-in-charge or his representatives and the Inspecting Officers as defined in the contractor's Labour Regulations.

When work is done near any place where there is risk of drowning, all necessary safety and rescue equipment shall be provided and kept ready for use and all necessary steps taken for prompt rescue of any person in danger and adequate provision made for prompt first aid treatment for all injuries likely to be sustained during the course of the work. Notwithstanding the above conditions (i) to (xiv) the contractor is not exempted from the operation of any other Act or Rules in force.

4.3.10 GENERAL REQUIREMENTS

- a) Any other requirement whether specifically indicated or not, but found necessary to be incorporated at a later date for safe and efficient operation of the plant shall also be deemed to have been covered within the scope of work of this tender.
- b) Wherever required dewatering shall be done by the contractor to avoid damage of equipment, structural, etc. and timely completion of work.
- c) If any certification or approvals are to be taken from electrical inspector/statutory bodies, DGMS, the same shall be the responsibility of the contractor.
- d) As per system requirement envisaged in the NIT documents, various parameters, specifications may undergo changes during detail engineering stage. This shall be carried out by the contractor

without any increase in cost.

- e) All safety regulations, code of practices for power supply, manufacturer, installation, erection, commissioning etc. envisaged by the State Govt./Central Govt. or any authorities/bodies shall be strictly complied without any increase in cost.
- f) All Mines Acts and regulations will be followed during construction stage.

SUB-SECTION – 4.4

TECHNICAL SPECIFICATION

SUB SECTION 4.4.1 TECHNICAL SPECIFICATION (MECHANICAL)
RAPID LOAD OUT SYSTEM

1. BASIC PARAMETERS

- a) Number of Hopper : 1 (One) hopper for Washed coal & Washed (coal Power) (either Clean coal or washed coal(power) shall be loaded at a time) complete with all fittings and fixtures (Maintenance gates, Charging gate, Pre-weigh hopper, Discharge / loading gate, telescopic chute, hydraulics, power pack, compressor, Air blaster etc)
- b) Hopper capacity : 500 T
- c) Loading capacity : Avg. 5500 TPH
- d) Creep speed : 0.8 km/hr to 1.2 Km/ hr
- e) Total moisture% of washed coal : Max. 9.5%(apb.)
- f) Total moisture% of Washed coal(Power) : Max. 9%(apb.)
- g) Hopper side slopes : Minimum valley angle 67°.

2. SYSTEM DESCRIPTION

The rapid load out system is a facility for flood loading of wagons. The loading station shall be located over railtrack for transportation of coal. The train/ rake consists of 59 wagons (maximum) of 60 t capacity each (as per railway norms) and will be loaded at the average rate of approximately 5500 TPH. The system shall be capable to handle all type of wagons. The train will run under the loading point at a steady speed of 0.8 km/hour to 1.2 Km/hr. Each wagon will take one minute to pass under the loading point. The system envisages loading of 60 t capacity wagon in about one minute. System consists of a 500 T capacity hopper having four opening for loading. Each opening is provided with one loading gate below the hopper over one pre weigh hopper assembly. Hydraulic system is envisaged for the operation of loading and discharge gates and telescopic chutes. The entire telescopic chute arrangement shall be made in such a way so that if in future, the handling of rake is done by electric engine, and the laying of the OHE is to be done as per prevalent RDSO guidelines applicable for SILO/ Hopper loading.

The column of the hopper shall be placed in such a way that the railway rake along with electric loco shall pass through it smoothly. Physical and Electrical horizontal and vertical clearances shall be as per

the Railway Norms. This includes the normal OHE conductor level from the rail top, The telescopic chute will be capable of handling semi solid / slurry material in rainy season. The equipment will be required to operate 18 hours a day and 330 days a year, but the design will be such that it can be operated 24 hours a day and 365 days a year. The surrounding may be quite dusty and surface temperature may vary from 4⁰C to 50⁰C and relative humidity up to 97%.

The rapid load out system as envisaged in this proposal shall have arrangement such that pre-weighed quantity of coal is discharged into each wagon and the individual weighment is recorded automatically when the weigh system is put in auto mode. Air vents shall be provided to allow displaced air from the weigh bin to be captured and prevent dust escaping from the system. Adequate no. of heat sensors and pneumatic arch breakers shall be provided.

3. OPERATION

When the presence of rake is detected near hopper, the telescopic chute is in position from parking position and permissive signal is given to the system for loading, the hopper loading gates shall open and then pre-weigh hopper will start filling. As the weight in the pre weigh hopper shall reach near to pay load of wagon/ 60 t, two gates will close while remaining two will close partially for trimming the hopper to the desired weight. When set point is reached the partially opened hopper outlet gates shall close and weigh hopper ready light will come on. As soon as the first wagon comes under loading system, the telescopic chute shall be lowered automatically and the discharge gate shall open. The material is loaded into the wagon and the discharge gate closes automatically as soon as weigh hopper is empty. Now the loading gates will open suitably for filling the pre weigh hopper. As the 2nd wagon approaches the loading gates shall start closing and by the time they are closed, full 60 t of material is discharged into the pre weigh hopper and is ready for filling the second wagon. In this manner the weigh cycle continues automatically until the full train/ all wagons are loaded.

After the loading operation is completed the chute shall go up after a pre set time. The weighing system shall also incorporate digital display system with suitable printer for printing of date, time weight of each weighment and net weight of coal weighment per operation of rake loading.

The hoppers are provided with load cells to weigh the material loaded in the hopper while gate is opened and the guillotine gates are closed immediately after filling of pre weighed quantity in the hopper, this is done automatically.

4.0 OPERATION OF TRAVERSING /TELESCOPIC CHUTE

Pre weigh hopper along with telescopic chute is provided with high speed load out to load wagons. The chute shall be traversing/telescoping loadout chute. The traversing capability of the entire loadout chute shall allow the chute to be stored at a position out of the railroad envelope and then traversed to a position over the centre line of the railroad tracks once the train engine has passed the

discharge area of the loadout. The facility has following functions:

- 4.1 The traversing / telescoping loadout chute comes down from the parking position to the load position under the load out weigh bin.
- 4.2. The opening and closing of the nominal 1525 mm x 1525 mm size gate at the bottom of the weigh bin.
- 4.3 The chute shall move up or down to the proper position in order to profile the loading of coal into wagon.
- 4.4 The vertical position of the telescopic chute shall be controlled by the operator based on the wagon height that is being loaded.
- 4.5 There shall be a discharge gate. The material is loaded into the wagon and the discharge gate closes automatically as soon as weigh hopper is empty .

5.0 OVERHEAD HOPPER

5.1 GENERAL FEATURES:

The hopper shall be of RCC and designed to take all the loading as required for the system. Necessary structural work shall also be provided to house the lift, stairs, necessary platforms, etc.

The hopper shall be designed on the basis of “Mass Flow” concept, so that chances of bridging, arching, rat-holing at hopper outlet is minimised. The sloping sides of the hopper shall be provided as per test report for free flow. The hopper shall be lined with 10 mm thick stainless steel of 409M grade liner up to the top of the conical portion of the hopper from the bottom openings. The width of the SS Liner shall not be more than 1000mm at top end of cone and the gap between the liner and concrete shell shall be filled with lean concrete. Sufficient weldments shall be provided at the joints so that liner does not come out. Vertical portion of the hopper wall shall have ferrosite lining of 25 mm minimum thickness up to one (1) meter above the highest surface of vertical wall coming in contact with coal.

However, because of wide fluctuations in the condition of the run of mine coal being fed into the hopper, due to seasonal impurities etc. there may be possibility of arching or bridging. To overcome the situation a pneumatic arch breaking device (as elaborated elsewhere) shall also be included.

5.2 LEVEL INDICATION INSIDE OVERHEAD HOPPER

The level indicators provided shall monitor –

- i) Continuous level of coal in the hopper
- ii) Pre determined high coal level in the hopper which will automatically stop the hopper in feed conveyor.
- iii) Pre-determined low level in the hopper, which will automatically close the hopper outlet gates.

This is to prevent damage to the hopper outlet gates. This shall be preferably Ultrasonic/ Radar type complete with sensor, transmitter and limit controllers, etc and audio visual signalling

system for different levels.

5.3 LOAD OUT SYSTEM

5.3.1 HOPPER OUTLET GATES

Hopper bottom shall have four number of openings for discharge of coal into one number of pre-weigh hopper. Each opening will be fitted with two number of gates, one maintenance gate below which one hopper discharge gate. Below hopper there shall be one pre-weigh hopper. For discharging coal into the pre-weigh hopper, hopper opening shall be fitted with four (4) quick acting hydraulically operated guillotine type double blade knife edged hopper discharge gates and four (4) number of hydraulically operated maintenance gates. Each gate shall be double bladed bi-parting slide gate. The gate support system shall be of sturdy construction and designed to take impact during quick discharging operation. The gates while opening shall load coal into the pre-weigh hopper.

The operation cylinders shall also be provided with positioners to provide a reduced feed rate at near balanced condition at the end of the operation to achieve a precise cut off at the desired weight. As the loading of pre-weigh hopper up to 60 t is complete, the hopper outlet gates will close. The hopper outlet gates shall automatically repeat operation (i.e. quickly close and open) to clear any trapped material between gates.

6.0 PRE-WEIGH HOPPER

There shall be one pre-weigh hopper of 72te capacity installed at bottom opening of 500T RCC hopper having about 1.2 times the wagon payload capacity. The pre weigh hopper shall be of mild steel construction and designed to take shock and impact loads during filling and discharging operation.

The inside of the pre-weigh hopper shall be lined with stainless steel liners of 409M grade. The slopping sides of the hopper shall be 72 degree or as per test report for free flowing and lined with 409M grade stainless steel. The hopper shall have large gate area to ensure maximum discharge rate for clearing of the weigh bin on each operation cycle and matching with the train speed and size of the individual unit train wagons.

The pre-weigh hopper shall be supported on high quality strain gauge dual bridge load cell assemblies forming into a weigh bridge system with twin connectors.

The load cells shall have an overload protection of at least 150% or more of rated capacity and structurally safe to 300% of rated capacity. The load cells shall be housed in temperature control shrouded complete with insulation. They shall have all necessary assembly, hardware for smooth operation of the load out system. There shall also be an arrangement for setting the weight in pre weigh hopper from 55 te to 62 te .

6.1 PRE WEIGH SYSTEM – TEST WEIGHTS AND ACCURACY

i) For testing and calibrating the pre weight hopper system, test weights shall be supplied with the

system. These test weights shall be approved by the Weights and Measures Department.

- ii) The test weights may be integral with the weigh system and shall provide for easy calibration of the weigh system in shortest possible time after each rake loading.
- iii) The weigh hopper system shall be capable of pre weighing coal for each wagon to an accuracy of $\pm 0.1\%$ of the set point.
- iv) The weigh bridge for the pre-weigh hopper system shall have check rods and brackets of suitable design.

6.2 DISCHARGE GATE

This gate will be located at the bottom of the weigh bin and will have a nominal 1525 mm x 1525 mm internal opening and will be of horizontal slide blade non jamming type design. It will have the following specific features.

- i) The blades of this gate shall be minimum 32mm thick mild steel plates with throat liner of 8 mm abrasion resistant steel liner (Min.360 BHN) plug welded.
- ii) Each gate shall be operated by two(2) heavy duty hydraulic cylinders.

7. TELESCOPIC CHUTE

The telescopic chute arrangement with bottom discharge gate should have nominal 1525 mm x 1525 mm opening and have the following specific features :

- i) The chute shall move both horizontally and vertically.
- ii) In the event of power failure, the telescopic chute shall rise to the full up position.
- iii) The telescopic chute shall move from load out position to parking position by traversing across for passing locomotive.
- iv) Chutes wall shall be constructed of 10 mm (min) mild steel plate with abrasion resistant steel liner plates plug welded.
- v) Chute and discharge gate shall be electrically and hydraulically interlocked.
- vi) Necessary arrangement shall be provided to give automatic retraction of chute if contact with forward moving wagon or locomotive is made.
- vii) The chute shall have breakway section such that in the event of a roll back by the locomotive or a wagon and the chute not retracting in time, the shear bolts would be cut and the lower gate section will merely drop into the wagon safely without any damage to other parts of the chute system.
- viii) A breakway section shall be provided at the lower most section of the chute so that any wagon hitting this section will crush it without causing any other damage to the chute. This crushable section will be replaceable.
- ix) The chute shall be actuated by heavy-duty hydraulic cylinder.

- x) Nominal opening Range and play of telescopic chute should be 3.9 meter and/or as per Railway but for electric engine, the unwired zone of electric traction shall be 7.8 meter and must play between 3.93 m to 5.5 m roughly.

8.0 HYDRAULIC SYSTEM

8.1 HYDRAULIC POWER PACK

Hydraulic system shall be supplied for operation of each of the hopper outlet gates, the discharging gates and the chute system. The system shall be identical to maximise reliability and interchangeability. The rating of all hydraulic equipment /component shall be well above the duty for which it is required and shall be suitable for operation in tropical climate and dusty atmosphere.

The Hydraulic Power pack shall incorporate hydraulic pump (which will provide immediate back up in the event of pump failure) with electric motor, fluid supply tank fitted with necessary pressure and control equipment, filters, gauges, pipe/ high pressure hose work etc.

There shall be a complete standby power pack arrangement consisting of electric motor, pump, pressure regulating section to provide the backup in the event of failure of the system.

The Fluid supply tank shall have ample capacity appropriate to its duty. It shall be fabricated in mild steel and provided with flanged connections for the supply and return pipes. Provision for complete drainage shall be made and flanged apertures for sludge removal shall be incorporated. All pipes returning fluid to the tank shall terminate at a level sufficiently below the fluid surface to prevent aeration. Each suction pipe shall be fitted with a high efficiency filter positioned well below the fluid surface to prevent vortex formation. Preferably the pump may be provided with positive suction head by elevating the tanks above the pumps. The tank shall be equipped with the following gauges etc:-

- a) Sight glass giving clear visual indication of fluid level
- b) Low fluid level device with visual and audible alarms.
- c) Temperature sensing device with visual and audible alarms.
- d) Pressure gauges.

All hydraulic pipe/hose work shall follow the shortest practicable route in neat, straight runs, readily accessible for maintenance yet sited in a position which presents least risk of mechanical damage. Pipe work in unavoidable exposed position shall be effectively protected and all pipe work shall be adequately supported. Electric motor shall be squirrel cage induction motor suitable for 415 VUU±UU 10% .

The electric motor operated oil filling section also to be included in the system design and suitable provision to be made. The hydraulic power pack shall be a complete closed and enclosed unit to protect the system from the coal dust. The complete enclosure shall be suitably designed by keeping the maintenance aspects in consideration. All the valves to be suitably protected against the dust accumulation.

8.2 HYDRAULIC ACCUMULATOR

Each of the hydraulic system shall also incorporate back up protection in the form of hydraulic accumulator, so that in the event of power failure, or pressure failure closing of the gates can be achieved. The accumulator shall have sufficient capacity for a normal open /close of hopper outlet emergency or flood loading gate. The accumulator system shall also include necessary hydraulic/electric control with audio visual alarms. Hydraulic accumulator control should have pressure release valve to be controlled from console.

8.3 HYDRAULIC CYLINDERS

These shall be of suitable bore and stroke double acting cylinders with cushioned ends. Hydraulic seals shall be suitably selected to prevent ingress of dust and moisture and to provide for longer life..

9.0 DUST CONTROL BETWEEN HOPPER OUTLET GATES AND PRE-WEIGH HOPPER

The loading rate at this zone being tremendously high may generate lot of dust. Suitable flexible dust cover may be provided between the hopper outlet gates and pre-weigh hopper for air vent without release of dust. If required the coal dust may be extracted to finally discharge the clean air into the atmosphere.

9.1 DUST CONTROL DURING WAGON LOADING

A sufficient number of precision and anti clog nozzles made of stainless steel shall be fitted at suitable places at the loading point for suppression of dust during loading operation. The nozzles shall provide high pressure atomised sprays of water or/water mixed with suppressant for effective suppression of coal dust.

The dust suppression system shall be so interlocked that it operates only when the loading operation is on. The suppression system shall be complete with necessary piping, pumps, fittings and fixtures etc. The system may be part of the total dust suppression system as per scope of this tender with one standby pump. The pumps shall be located at the base of hopper with all piping connections to dust suppression system. The pumps shall be connected to main water supply pipeline.

10.0 CHAIN PULLEY BLOCKS

Necessary Chain Pulley blocks of adequate capacity at suitable points shall be provided in respective floors and intermediate floors for hoisting and lowering of equipment/components.

11.0 LUBRICATION SYSTEM

Automatic lubrication shall be provided to all required locations, if required. Necessary facilities for lubrication system shall be provided.

12.0 FIRE FIGHTING SYSTEM

In addition to provision of hydrants at hopper loading complex, an additional hydrant pipe shall be laid from ground level to the top of hopper. This pipe shall be connected to a pipe laid along the perimeter at hopper top with two outlets to flood the hopper inside in case of fire in stored coal. The

control valve of this pipe shall be at ground level.

13.0 PNEUMATIC ARCH BREAKER

The Arch Breaker of suitable capacity in adequate numbers shall be compressed Air operated. A separate air compressor shall be supplied for operation of the Arch Breaker.

The Arch Breaker shall be designed to suit the duty requirement and shall discharge air into the coal with sufficient energy to break the arch. The arch breaker shall be complete with compressed Air Cylinder, quick release valve etc.

Adequate number of holes around the hopper at suitable locations with cast in tubes/pipes with blind flanges shall be provided to facilitate connection to the arch breaker installed at suitable location. These holes shall also be utilised for injecting inert gas inside hopper for fire fighting purposes.

AIR COMPRESSOR

One working and one standby compressor of suitable capacity shall be offered.

This shall be electrically driven, compact preferably horizontal air receiver mounted. The compressor shall have sufficient piston displacement and operating pressure to suit the duty requirement of the arch breaker.

The compressor shall be complete with pressure gauge, safety valve, pressure switch, non-return valve, air piping/hoses for connection to arch breaker, drives etc.

The operation of the compressor to charge the Arch Breaker shall be from the main control room only.

14.0 FREIGHT CUM PASSENGER LIFT

1.0 GENERAL REQUIREMENT

The industrial duty lift will serve the various levels at ground, different working floor levels of the hopper and any other levels as may be felt necessarily during detail engineering stage for efficient plant maintenance and operation. The lift will have the following operating parameters as per IS.

The lift shall have following operating parameters:

- | | | | |
|------|--------------|---|----------------------------|
| i) | Type | - | Freight-cum-passenger lift |
| ii) | Capacity | - | 1000 kg |
| iii) | Speed | - | As per requirement |
| iv) | Lift size | - | As per relevant IS |
| v) | No. of steps | - | As required |
| vi) | Quantity | - | 1 |

The lift shall be of sheet steel (16 SWG MS Sheet) construction with 5 mm thick heavy duty chequered floor and automatic stainless steel doors and shall be complete with UP/DOWN

ARROWS at all landings and with semi-dual (with/ without attendant) operation position indicator and battery operated alarm belt, necessary switches, brakes, push button, limit switches, safety gears etc . The design, supply and installation shall conform to the relevant Indian Standards and Codes of Practices. The machine room shall be located at the top of the lift shaft and the lift shall travel from ground to Hopper top with steps at intermediate floors as required and designed, constructed and installed in accordance with the latest version of the following standards:

1. IS: 14665 (Part-1):2000 : Guidelines for Outline Dimensions
2. IS: 14665 (Part-2,Sec-1&2 :Code of Practice for Installation,
Operation & Maintenance
3. IS: 14665 (Part-3,Sec1&2):2000 : Safety Rules
4. IS: 14665 (Part-4,Sec-1to9):2001 : Components
5. IS: 14665 (Part-50):1999 :Specification, Inspection Manual
6. IS: 7754-1975 :Design, Installation, Testing &Operation
7. IS: 732 : Code of practice for electrical wiring installations
8. IS: 2365 : Steel wire suspension ropes for lifts, elevator& hoists
9. IS: 8216 : Guide for inspection of loft wire ropes

Besides the above, other internationally acceptable Standards, which ensure equal and higher performance & safety than those specified above, shall also be acceptable.

Indian Electricity Act 2003, Indian Electricity Rules 1956.

For lift, installation, operation and maintenance should be carried out in conformity with lift acts and rules in force.

Conformity with Fire/Indian standard Specifications/ Regulations

The installations shall be carried out in conformity with local fire regulations and rules in force. All materials, fittings, appliances etc. used in electrical installations shall conform to Indian Standard Specifications.

2.0 TECHNICAL PARTICULARS OF PASSENGER LIFTS

Sr. No.	Particulars	
1	Type	Freight-cum-passenger lift
2	Number of lifts required	1
3	Load -Kgs.	1000 kg

4	Speed – m/sec	As per requirement
5	Travel – mtrs	(i) from ground to top of Hopper
6	Stops & Openings	As per requirement of design (All openings on the same side)
7	Power Supply	415 Volts 3 phase, 50 Hz. Alternating Current
8	Control	PLC Control
9	Operation	Simplex. Full collective (with/ without Attendant)
10	Machine	Geared traction machine placed directly above hoist way in machine room
11	Car Size (W X D) – mm	As per Requirement
12	Hoist way required	As per Requirement
13	Car Panels	All plain powder painted panels
14	Handrails on 3 sides	M. S. Powder Painted - Black Matt
15	False Ceiling	To be provided
16	Flooring	As per requirement
17	Car Entrance	Protected by centre opening sliding steel door in plain powder painted finish
18	Hoistway Entrances	Protected by centre opening sliding steel doors in plain powder painted finish
19	Door operation	Automatic
20	Signal details	1) Combined luminous hall button and digital hall position indicator 2) Integral full height car operating panel with luminous buttons digital car position indicator combined with direction arrows overload warning indicator and service cabinet 3) Battery Operated Alarm Bell & Emergency Light 4) Fireman's switch at main lobby 5) Automatic Rescue Device

2.1 Automatic Rescue Device:

(i) ARD is to be provided with battery back-up.

The Automatic Rescue Device should operate automatically without any human intervention within a period of one minute, when the running lift suddenly stops due to power failure or system failure of the lift.

- (ii) It should move the halted lift slowly and safely in upward or downward direction to reach the nearest floor/landing door and then to open the door automatically as well as to park the lift there with door open enabling the trapped passengers to exit.
- (iii) Whenever the Power supply resumes during the running of the lift in ARD mode operation the lift should continue to run in the ARD mode until it reaches the nearest landing and the door are fully opened.
- (iv) If the normal power supply resumes when the lift is at the landing , it should automatically be switched over to the normal power operation mode.
- (v) All the safety devices of the lift should remain active during the ARD mode operation.
- (vi) The device should have batteries for power back-up during the period of power failures. The back-up time should be enough to provide at least 6(six) rescue operations within a period of 1(one)hour.

Sealed maintenance free batteries should be used.

2.2 Safety:

Full-length multi-ray (infra light curtain)

Electronic door detector system

The car shall be equipped with an electronic door sensor which can detect an obstruction at the car entrances and control the closing of the doors. This prevents the passenger, wheeled stretcher and wheeled chair from getting bumped by the closing doors and relieves the user from holding down the OPEN button. The sensor shall scan for any object across the full height of the car entrance. The doors shall reverse immediately if the sensor detects any obstruction at the car entrances.

3.0 CAR

The car shall be enclosed on all sides by means of car body with centre opening sliding type door sliding horizontally and consisting of two panels with vision panel opening from the centre and so inter connected that they move simultaneously with provision of power operated device for opening and closing of doors. The enclosure shall be of sufficient strength to withstand thrust forces. The sides of car shall be lined with heavy gauge sheet panels properly braced and reinforced. The enclosure shall be flushed on the inside and securely fastened to the platform. The roof shall be covered with sheet metal. The construction of roof should be strong enough to be capable of supporting at least two persons. The car shall be equipped with fan with grills and suitable lighting complete with fittings and shall be provided with separate switches for fan and light.

Provision shall be made for car door electrical contact, electrical and mechanical interlock, electro mechanical lock, emergency stop push button, floor selector and floor stopping switch.

4.0 HOIST WAY DOORS

The hoist way doors shall be horizontally centre opening steel sliding door with wide vision panel at each landing of dimension matching with car door.

5.0 DOOR HANGERS AND TRACK

Hangers and tracks for car door and each hoist way door shall be furnished. Suitable material shall be used to minimize noise. Rollers or equal arrangement shall be provided to take upward thrust of the doors. All required materials for landing entrance shall be provided.

6.0 OPERATIONS FOR CAR DOORS AND HOIST DOOR

The car door and the hoist way door shall open automatically when the car stops at landing. In case of power failure, the door operations shall be so designed that it can be opened manually from inside the car. The hoist way door shall not open automatically before the car reaches at landing level.

7.0 CONTROL, OPERATION & INTERLOCK

The control system governing, starting, stopping, direction of motion, acceleration, speed and retardation and accessories required for satisfactory and trouble free operation, protection and control of the lift shall be provided.

The lift shall be suitable for automatic operation by a momentary pressure of a button such that the lift car is set in motion and caused to stop automatically at any required landing.

The lift operation shall conform to the following requirements:

The operation of the lift shall be through a push button station located inside the car.

- a) The lift shall not move unless the car door, landing door and all other protected openings connected with control circuit are closed.
- b) The push buttons, one for upward movement and the other for downward movement, at each terminal landing shall be provided in order to call the car.
- c) The landing doors shall be inter-locked so that the landing door of any floor shall not open when the lift is not on that floor.
- d) Push button shall be fixed in the car for holding the doors open for any length of time.

Provision shall be made for **safety gear**, terminal slow down switch, terminal stopping switch-normal, **terminal stopping device-final**.

8.0 CAR OPERATING PANEL

In the car, there shall be an operating panel containing push buttons, elevations of the landings served; two-position key-operated switch, marked to indicate “with attendant” and “without attendant”; an emergency stop switch; a buzzer; an emergency call button connected to a bell to serve as an emergency signal;; push button or switches for lighting and fan; other push buttons; switches, etc. as required.

9.0 INDICATOR

The lift shall be provided with position indicator and call indicators inside the lift car to show the position of the lift car with reference to the floor numbers and the landing from which the call is being received. Up and down travel direction and position indicating signals shall be provided on each landing for the lift. Various indicators shall be of standard construction.

10.0 TERMINAL BUFFERS

The terminal buffers shall be provided for stopping the car and the counter-weight at the extreme ends of travel. Buffer support channels required to install the buffers shall be supplied.

11.0 LOAD PLATE

A load plate giving rated payload of the lift shall be fitted in the car in a conspicuous position. The rated load shall be given in kilograms and also in number of persons.

12.0 COUNTER WEIGHT AND COUNTER WEIGHT FRAMES

Counter-weight sections shall be mounted on structural metal frames so designed to retain the weight securely in its place. Counter-weight frames shall be guided on each rail guide by upper and lower guiding members attached to the frame. A substantial metal counter-weight guard of required length shall be provided at the bottom of the hoist way.

13.0 GUIDES FOR CAR & COUNTER WEIGHT

Car and counter-weight guides shall be of rigid steel and shall be continuous throughout the entire lengths and shall be provided with adequate steel bracings and stiffeners. Guides for both car and counter-weight shall meet with the requirements of IS:4666. Necessary lubrication device for guide rail shall be provided.

Normal Terminal Limit Switch shall be provided to slowdown and stop the car automatically at terminal landings and final limit switches shall be provided to automatically cut-off the power and apply the brake, to stop the car travel beyond the terminal landings.

14.0 DRIVE MOTORS

The design ambient temperature for the equipment shall be taken as 50 deg. C. The insulation shall be Class 'E'. Necessary brakes shall be provided in the traction machine. Protective devices shall be provided on the controller to protect against phase reversal, low voltage and phase failure. Overload and other protective relays shall also be provided.

Drive shall be AC Variable voltage, variable frequency (V3F) with closed loop.

The lift shall be driven by a squirrel cage TEFC induction motor to IP 55 protection and suitable for 120 Starts/hr. Motor and all electrical should have a dust proof sealing arrangement.

The kW rating of main drive motor shall be selected keeping a minimum margin of 15% over maximum power requirement.

The operation shall be Simplex Full collective control with/without attendant

15.0 OTHER ACCESSORIES

All other accessories like switches, fuses, contactors, cables, etc shall be provided as per requirement.

16.0 SPECIFICATION FOR FIRE FIGHTING SYSTEM

1.0 INTRODUCTION

Dispatch system consists of one hopper with rapid loading system.

2.0 FIRE PROTECTION

Fire fighting system shall be provided to protect the dispatch system from fire hazards. The design and installation of the system shall comply with the regulations of the Tariff Advisory Committee (TAC) of India/ National Fire Protection Association (NFPA), USA, Codes.

The various fire fighting systems & facilities and the areas protected thereby shall be as under :

Sl. No	Fire Fighting System :	
i)	High pressure Hydrant system	Hopper complex (Upto conveyor discharge level)
ii)	Mobile/portable fire extinguishers	Hopper complex, Substation & Control room
iii)	Fire detection	Substation and Control room

2.1 High Pressure Hydrant System

Water from the reservoir shall be pumped by adequate number of electric motor driven centrifugal pumps for the hydrant system. One diesel engine driven pump shall be provided as a standby for the hydrant system. The fire pumps shall be of the same capacity and suitable for parallel operation.

The hydrant system shall consist of a large network of pipes both underground and over-ground which shall feed pressurised water obtained from fire water pumps to a number of indoor and outdoor hydrant valves.

The hydrant main shall remain pressurised at a pressure not less than 7 kg/cm². In the event of a fire, the hydrants close to the seat of fire shall open, causing a drop in water pressure in the hydrant main which shall bring the fire fighting pump into operation automatically, ensuring steady supply of water to the system. If the main pump fails to start initially, the standby pump comes into operation automatically. However, the pumps can only be stopped manually after ascertaining that the fire is extinguished.

Total hydrants required shall be estimated as per TAC recommendations. Proposed locations of hydrants shall be shown by the bidder in the form of table and drawing.

2.2 Fire Detection and Alarm Annunciation System

The Fire detection system shall be “Conventional wired type”. A microprocessor based addressable automatic fire alarm control panel (Loop Controller) with necessary controls and signal indications has been envisaged to annunciate a fire alarm. This panel shall receive the electric signal from the fire / heat / smoke detectors, Manual Call Points (MCP), hooters, Response indicators (group flashers), isolator and control modules etc. and convert it into visual and audible alarm and also incorporate a facility to provide an alarm at a remote location. Area under protection shall be divided into loops depending upon the number of detectors, Manual Call Points, different type of interfacing modules etc. and each detector shall be addressable type having unique address to pinpoint the exact location of fire. The detectors for each loop shall be connected to the control panel by a separate pair of 2-core cable, thus separating the visual indication for each loop.

The fire alarm panel / loop controller shall be located at a place where attendant shall be available round the clock 24 Hrs..

2.3 Portable/ Mobile Fire Extinguishers

Various types of portable and mobile fire extinguishers shall be provided at strategic locations in the entire plant for fire protection.

3.0 TECHNICAL REQUIREMENTS

3.1 High Pressure hydrant System

The total water requirement of the hydrant system shall be met by suitable capacity pumps in accordance with the stipulations of the Fire Protection Manual of TAC/NFPA considering the coal handling plant as an ordinary hazard occupancy. The pump head shall be so selected that a minimum running pressure of 3.5 kg/cm² is available at the hydraulically remotest/highest hydrant point.

Water for the hydrant system shall be handled by two pumps, one driven by an electric motor and the other driven by diesel engine. The pumps shall be horizontal centrifugal type, drawing water from the fire water sump.

Pumps in the high pressure hydrant system shall be suitable for parallel operation.

The number of hydrants shall be in accordance with TAC/NFPA regulations. A set of two lengths of 15 m hoses, a nozzle and a branch pipe shall be kept in hose boxes adjacent to each hydrant.

Hose houses shall be located at strategic places, each covering a group of external hydrants.

Fog nozzles shall be used for spraying atomised hydrant water on electrical fires in a discontinuous fog jet to avoid electrical shocks.

Air release valves shall be provided at the highest points of Hopper complex, sub-station and control room.

3.2 The hydrant system shall be kept pressurised by jockey pump of suitable capacity to make up small system leakage and maintain pressure in hydrant system.

Jockey pump shall cut in approximately at 0.35 kg/cm² drop and cut out at normal system pressure. Fire pumps shall be arranged to cut in approximately at 1 kg/cm² drop and cut out manually at churn pressure.

17.0 Miscellaneous Equipment

The following items will be provided wherever necessary throughout the plant:

1.0 Compliance With Standards

The design, selection, and construction of equipment, components and material shall conform to relevant Indian Standard Specifications and Codes of Practice incorporating the latest revisions or in their absence to equivalent BS/DIN/AMERICAN Standards.

1.1 Chain pulley block

Chain pulley blocks of suitable capacity will also be provided wherever required for effective maintenance of equipment. The number and capacity will be fixed during detail design stage. The chain pulley block shall have chain & wheel facility to move in horizontal and vertical locations.

The effort required at pulling chain will not be more than 25 kg at full load and speed. The hanging structures will have an outside projection for easy handling of material. The supply will include complete chain pulley block with hanging structure.

2.0 Pollution Control System

To eliminate dust at dust generating points dust suppression (Fog type) arrangement has been envisaged as given in the following table-

Sl.No.	Locations/Dust generating points	Fog type DS/ DE
1	Hopper Top	Fog type DS
2	Wagon loading	Fog type DS

2.1.1 Dust Suppression System (Fog Type)

Automatic Fog type dust suppression system employing water has been envisaged to minimise the water consumption. Fog system shall be capable of generating water fog to suppress dust generated during loading. Fog system for dust suppression shall be complete with storage tank, pump, micron water filters, nozzles, water pipe line and necessary water treatment arrangements to eliminate the possibility of nozzle choking and scale formation in pipe lines. The nozzle shall be of stainless steel which can withstand orifice wear due to high pressure. Flow rate of nozzles shall be at sufficiently

high pressure to suit the requirement of fogging. Provision to control the quantity of fog shall be made. System shall be equipped with on/off/auto switches. The system should be suitable to work with the available plain Industrial water received from main reservoir of Project.

3.0 Noise and vibration control

It is a fact that noise pollution causes fatigue to operation personnel. Every effort will be made to keep down the noise Level to the extent it is feasible. All machine mounting will have suitable arrangement for reducing the vibration and thereby noise. All transfer chutes within synthetic/Rubber lining. The noise level near the noise generating points will be maintained below 75 dB as per relevant Indian/ International standards.

4.0 Safety devices

All the equipment shall be provided with necessary safety devices such as emergency stop switches, overload protection etc wherever applicable. All equipment in the stream will be started and stopped from the central control room in a pre-determined sequence consecutively. In case of stoppage of any equipment in the circuit for any reason, all the preceding equipment shall be stopped automatically.

5.0 Repair facilities

Necessary spot repair facilities shall be provided for plant and equipment including lifting tools and tackles. Provision for site storage of spares and tools shall also be made. All lubrication charging points shall be dust free. Suitable arrangement shall be made to facilitate automatic changing of conveyor belt.

6.0 Plant cleaning and drainage

6.1 Suitable arrangements shall be made for cleaning of plant especially at the spillage point with the help of vacuum cleaners in case of electrical panels and plant equipment.

Plant cleaning points shall be provided at loading point. The effluent shall be discharged into a suitable location by drainage. Compressed air points should be provided at different floors wagon loading complex for cleaning. These shall be served by portable compressors as envisaged in the bid document.

18.0 MAINTENANCE & SAFETY

1.0 Safety Precautions and Provisions

1.1 Proper safety precaution and provision shall be provided as per relevant Indian Standards.

1.2 Adequate lighting provision shall be made in the control rooms for natural lighting. For night operations, the lighting arrangements shall conform to IS: 3646 –1986 ‘Code of Practice for interior illumination : Part 1 Principles of good lighting and aspects of design, IS:3646-1968 ‘Code of Practice for interior illumination Part 3 calculation of coefficients of utilization by the BZ method’

1.3 Adequate ventilation facilities shall be provided wherever required to protect men and equipment.

2.0 Marking of Controls:

2.1 All controls shall be marked with the words appropriate to the function they control, such as stop, start, forward, reverse, raise or lower. Arrows indicating the direction of travel control shall be provided at all forward and reverse controls.

2.2 Location of signs – Each stop control shall be readily accessible and shall be indicated by a standard or uniform type signs erected in suitably conspicuous positions and shall have letters not less than 15 mm high.

3.0 SAFETY GUARDS :

3.1 Guards shall be designed to prevent injury to persons and shall be provided at every dangerous part of equipment normally accessible to personnel. They shall be designed to form part of the equipment and shall not in themselves create hazards.

3.2 Guards shall be provided to prevent accidental contact by persons or parts of clothing being caught in equipment. All guards shall comply fully with the requirements of the relevant statutory authority.

3.3 All sheet metal guards shall be aluminium. All guards shall be painted safety yellow.

3.4 Lifting handles or lugs shall be provided where required for the safe removal or opening of guards.

4.0 SAFETY AND IDENTIFICATION SIGNS :

4.1 Safety and identification signs shall be placed on all equipment and work areas. All signs shall be painted with luminous paint on 2.5 mm minimum thickness brass or stainless steel sheet.

4.2 Identification signs shall be bold, lettering (minimum of 50 mm high) on a white background. Each item of equipment shall be clearly identified with a minimum of two signs.

4.4.1 All equipment and work areas shall have signs for :

- a) Hearing protection
- b) Warning that equipment may start without notice
- c) High voltage
- d) Eye protection.

19.0 Inspection and Quality Control Before Dispatch

1.0 Inspection and Quality Control Before Dispatch

i) Special Material

The manufacturer should furnish during inspection without extra charge test certificates covering mechanical properties and chemical composition for special raw materials used including that of liners. The certificates should be from the accredited testing laboratories like CMERI, Durgapur, NPL, New Delhi. etc. If considered necessary, samples for material may be selected as per IS :1548 (Current) by the Employer's representative from amongst the raw materials and manufactured components of equipment and got tested in the approved laboratory. In case samples so selected fail to

meet the standard specifications. the whole lot of manufactured components will be rejected and disqualified for use again for any of the Employer's supplies.

ii) Stage Inspection

Employer reserves the right to carry out inspection at any stage of the process of manufacture and assembly for which all facilities will be provided by the Contractor. Before carrying out such inspection, necessary information will be given to the manufacturer by the Contractor.

iii) Availability of Standard Specification Meters, Gauges etc. for Testing & Inspection.

The manufacturer will maintain all relevant standards and codes of practice for manufacture, inspection and testing of components of the equipment ordered. He will also maintain a set of meters, gauges etc. as may be required for testing and inspection of components.

2.0 Checks during inspection

The details of the checks to be carried for various components are to be submitted by the contractor for Owner's approval. However, some indicative checks on different items are given below which should necessarily form part of the quality assurance programme to be agreed with the Owner.

2.1 All plates above 20mm thickness to be ultrasonically tested for laminations.

After forgings and castings to be checked for hardness, microstructure and ultrasonic testing in addition to check for chemical and mechanical properties

2.2 Following minimum NDT requirements to be ensured for welds.

i) Butt welds : 10 % Ultrasonic / Radiographic and 100 % MP/ DP test

ii) Fillet welds : 10% Magnetic Particle/ DP test

SUB-SECTION – 4.4.2

TECHNICAL SPECIFICATION (ELECTRICALS)

SUB-SECTION – 4.4.2
TECHNICAL SPECIFICATIONS

2.1 GENERAL INFORMATION

- 2.1.1 The supply and installation of electrical equipment specified herein are required for both indoor and outdoor.
- 2.1.2 The successful tenderer shall furnish all, but not limited to, equipment, materials and accessories and services specified herein to complete this work. The work shall have to be completed and operative in all details. Any item of work or material which may not have been specifically mentioned but incidental to or necessary for complete installations and operation shall be provided by the Bidder without any additional charge to the purchaser.
- 2.1.3 The successful tenderer shall supply and/or erect the addition or modification as will be agreed upon in writing after mutual discussion.
- 2.1.4 The equipment to be furnished under this specification shall be packaged for shipment so as to meet the space and weight limitations to transport facilities, right up to destination.

2.1.5 STANDARDS

- 2.1.5.1 The equipment and materials to be furnished shall be designed, manufactured and tested in accordance with the latest revisions of the Indian Standards (IS). Where Indian standards are not available International standards like British Standards (BS), ISO, DIN, JIS or Other standards and International Electro-Technical Commission (IEC) publications unless otherwise stated, which ensures performance equivalent or superior to Indian standard shall be followed.
- 2.1.5.2 The equipment conforming to any other national standard which ensures equivalent quality is also acceptable. In such cases the tenderers shall clearly indicate the standards adopted and furnish a copy of the English Version of the Standard along with the tender.
- 2.1.5.3 The equipment covered under these specifications shall comply with all the latest applicable statutory rules, regulations, acts and safety codes which may be in force during the period of execution and which are related with design, construction and operation of equipment in the locality where the equipment is to be installed.
- 2.1.5.4 The electrical installation shall meet the requirement of Indian Electricity Act 1910 and Indian Electricity Rules, 1956 and Indian Electricity Act , 2003 , as amended up-to-date, Mines Rules and Regulations (latest revision) and also the applicable section of the latest revision of the relevant IS code of practice.
- 2.1.5.5 Nothing in these specifications shall be construed as to relieve the supplier of the responsibility

for correctness of the design and construction of the equipment. All the standards being followed shall be listed out in the bid. Where any foreign standard is being followed, the copy of the same shall be provided with the bid.

2.1.5.6 Wherever service conditions and requirements laid down in these specifications differ from applicable standards, the conditions specified herein shall prevail.

2.1.5.7 Distribution Transformers upto and including 200 kVA, Tubular Fluorescent Lamps, Ceiling Fans, Air Conditioners etc. shall bear minimum 3 star BEE labeling, whereas, LT motors shall be of EFF2 type for ratings specified by BEE.

2.1.5.8 In addition, any relevant regulations applicable to the work shall be followed. In case of any discrepancy, the decision of purchaser will be final.

2.1.6 **SERVICE CONDITIONS**

Ambient air temperature : 5⁰Cto 50⁰C.

Altitude : Maximum upto1000 M above MSL.

Relative Humidity : Approximately 97 %.

Pollution degree : Degree 4 as per IS : 13947 (Part I) (i.e. the pollution generates persistent conductivity caused by conductive dust)

2.1.7 **INSPECTION**

The manufacturer shall carry out a comprehensive inspection and testing program during manufacture for all bought out items and also workmanship during this stage. The manufacturer shall submit the inspection program at least four weeks prior to the purchaser.

The manufacturer shall carry out all standard routine tests in accordance with relevant IS. The manufacturer shall also carry out type tests in accordance with relevant IS on one piece of one rating. While the routine tests shall be carried out at manufacturer's works under prior information to purchaser, the type test certificates from reputed test houses shall be submitted for purchaser's approval giving details of each test and evaluation of test data.

Tests which are common to both type and routine tests may be covered under routine test in the presence of purchaser's representative, if required.

2.1.8 **TEST CERTIFICATE**

The equipment covered under these specifications shall be Type tested in accordance with relevant codes. The bidder shall supply at the time of execution the routine test certificates from the manufacturer indicating the type of tests conducted and the test results in accordance with relevant codes.

ANNEXURE : ES-1

SPECIFICATION FOR MOTOR CONTROL CENTRES AND DISTRIBUTION BOARDS

1. SCOPE

This specification covers requirements for 415 V Switch Boards/Motor Control Centres (MCC) incorporating circuit breakers or fuse switch units or any combination of these.

The Boards/MCC shall comply with the latest version of IS 8623 & IEC 439-1 except where modified or extended by this specification and with the relevant parts of standards mentioned in clause 2.0.

2. OTHER RELEVANT STANDARDS

The other relevant standards applicable are as under:

IS :13947	LV switch gear and control gear
IS :10118	Code of practice for selection, installation and maintenance of switchgear and control-gear
IS :4237	General requirements for Switchgear and Control gear for voltages not exceeding 1000 V.
IS : 3072	Code of practice for installation and maintenance of switchgear.
IS :6875	Switches and push-buttons
IS :13703	LV fuses for voltages not exceeding 1000 V AC
IS :12021	Specification of control transformers
IS :2705	Current Transformers
IS :3156	Voltage Transformers
IS :11353	Guide for uniform system of marking and identification of conductors and apparatus terminals
IS :2147	Degree of protection provided by enclosures for low voltage switchgear and Control gear
IS :3043	Code of practice for earthing
IS :6005	Code of practice of phosphating iron and steel.
IS :3202	Code of practice for climate proofing of electrical equipment
IS :2629	Hot dip galvanising
IS :5082	Wrought Aluminum and Aluminum alloys for electrical purposes
IS :722	A C Electricity Meters
IS :1248	Electrical Indicating instruments
IS :3231	Electrical relays for power system protection
IS :5	Colors for ready-mixed paints and enamels.
IS :1554	PVC insulated cables for working voltages up-to and including 1100V

IS :2551 Danger Notice Plates
IS :8544 AC motor starters of voltage not exceeding 1000 volts
IS :8686 Static Relays
IE Rules 1956

2.1 SERVICE CONDITION

Ambient air temperature -Minimum 5⁰C to Maximum 50⁰C with daily average ambient temperature of 40⁰C

Altitude - Maximum upto1000 meters above MSL.

Relative Humidity - Approximate 97 % during rainy season.

Pollution degree - Degree 4 as per IS: 13947 (part I i.e. the Pollution generates persistent conductivity caused by conductive dust.

2.2 OPERATIONAL CONDITIONS

Nominal system voltage - 415 V \pm 10 %

Supply frequency - 50 HZ \pm 3 %

System Earthing - Effectively earthed

Highest Fault Level - 31 MVA

3. CONSTRUCTIONAL DETAILS OF SWITCHBOARDS/MCC

3.1 All Switchboards, i.e., 415 V Switchgears, Motor Control Centres (MCCs), A.C. Distribution Boards (ACDBs) shall be of metal enclosed, indoor, floor-mounted, single front, free-standing type. Each panel shall comprise one or more of the modules mentioned in Annexure-A.

Fully equipped spare feeders are also considered in each motor control centre covering feeders of various capacities . No. of Spare feeders considered in each MCC are 10 % or 1 no. for each group of rating .

3.2 All switchboard frames and load bearing members shall be fabricated using suitable mild steel structural sections or pressed and shaped cold-rolled sheet steel of thickness not less than 2.0 mm. Frames shall be enclosed in cold-rolled sheet steel of thickness not less than 1.6 mm. Doors and covers shall also be of cold rolled sheet steel of thickness not less than 1.6 mm. Stiffeners shall be provided wherever necessary. The gland plate thickness shall be 3.0 mm (minimum) for hot/cold rolled sheet steel and 4.0 mm (minimum) for non-magnetic material.

3.3 All panel edges and cover/door edges shall be reinforced against distortion by rolling, bending or by the addition of welded reinforcement members. The top covers of the panels should be designed such that they do not permanently bulge/bend by the weight of maintenance personnel working on it.

- 3.4 The complete structures shall be rigid, self-supporting, free from flaws, twists and bends. All cutouts shall be true in shape and devoid of sharp edges.
- 3.5 All switchboards shall be of dust-proof and vermin-proof construction and shall be provided with a degree of protection of IP 52 as per IS:2147. However, the busbar chambers having a degree of protection of IP 42 are also acceptable where continuous busbar rating is 1600 A and above. Provision shall be made in all compartments for providing IP 52 degree of protection, when circuit-breaker or module trolley has been removed. All cutouts shall be provided with synthetic rubber gaskets. The switchboards which are meant for outdoor duty shall be provided with degree of protection of IP 54 as per IS:2147.
- 3.6 Fully equipped spare feeders are considered in each motor control centre covering feeders of various capacities . Number of spare feeders considered in each MCC are 10% or 1 No. for each group of rating.
- 3.7 Provision of louvers on switchboards would not be preferred. However, louvers backed with metal screen are acceptable on the busbar chambers where continuous busbar rating is 1600 A and above.
- 3.8 All switchboards shall be of uniform height.
- 3.9 Switchboards shall be easily extendable on both sides by the addition of vertical sections after removing the end covers.
- 3.10 Switchboards shall be supplied with base frames made of structural steel sections along-with all necessary mounting hardware required for welding down the base frame to the foundation/steel insert plates. The base frame height shall be such that floor finishing (50 mm thick) after erection of the switchboards does not obstruct the movement of doors, covers, withdraw-able modules etc.
- 3.11 All switchboards shall be divided into distinct vertical sections (panels), each comprising of the following compartments.
- a) **Busbar Compartment**
A completely enclosed bus bar compartment shall be provided for the horizontal and vertical busbars. Bolted covers shall be provided for access to horizontal and vertical busbars and all joints for repair and maintenance which shall be feasible without disturbing any feeder compartment. Auxiliary and power busbars shall be in separate compartments.
- b) **Switchgear/feeder Compartment**
All equipment associated with incomer or outgoing feeder shall be housed in a separate compartment of the vertical section. The compartment shall be sheet steel enclosed on all sides with the withdraw-able units in position or removed. Insulating sheet at rear of the compartment is also acceptable. The front of the compartment shall be provided with the hinged single leaf door with

captive screws for positive closure.

c) **Cable Compartment or Cable Alley**

A full-height vertical cable alley of minimum 175 mm width shall be provided for power and control cables. Cable alley shall have no exposed live parts and shall have no communication with busbar compartment. Cable terminations located in cable alley shall be suitably shrouded to prevent accidental contact by falling of tools etc. For distribution boards, the partition between the feeder compartment and cable alley made of FRP sheet may also be offered. It shall be of such construction as to allow cable cores with lugs to be easily inserted in the feeder compartment for termination. Wherever cable alleys are not provided for distribution boards, segregated cable-boxes with complete shrouding for individual feeders shall be provided at the rear for direct termination of cables in each individual feeder. For circuit breaker external cable connections, a separately enclosed cable compartment shall also be acceptable. The Contractor shall furnish suitable plugs to cover the cable openings in the partition between feeder compartment and cable alley, for at least 50% of the total number of feeders. Cable alley door shall be hinged.

d) **Control Compartment**

A separate compartment shall be provided for relays and other control devices associated with a circuit breaker.

3.11 Sheet steel barriers shall be provided between two adjacent vertical panels running to the full height of the switchboard, except for the horizontal busbar compartment. Synthetic rubber gasket shall be provided between the panel sections to avoid ingress of dust into panels. Each shipping section shall have full metal sheets at both ends for transport and storage.

3.12 After isolation of power and control circuit connections it shall be possible to safely carryout maintenance in a compartment with the busbar and adjacent circuit live. Necessary shrouding arrangement shall be provided for this purpose. Wherever two breaker compartments are provided in the same vertical section, insulating barriers and shrouds shall be provided in the rear cable compartment to avoid accidental touch with the live parts of one circuit when working on the other circuit.

3.13 All 415 V switchgear (circuit-breaker) panels shall be of single-front type MCCs and ACDBs shall be of single-front construction. All single-front switchboards shall be provided with single-leaf, hinged or bolted covers at the rear. The bolts shall be of captive type. The covers shall be provided with "DANGER" labels. All panel doors shall open by 90 degree or more.

3.14 All ACDBs shall be of fixed module type. All 415 V circuit breaker modules and MCC modules shall be of fully draw-out type having distinct 'Service' and 'Test' positions. The equipment pertaining to a draw-out type incomer or feeder module shall be mounted on a fully withdraw-able

chassis which can be drawn out without having to unscrew any wire or cable connection. Suitable arrangement with cradle/rollers and guides shall be provided for smooth movement of the chassis. For modules of size more than half the panel height, double guides shall be provided for smooth removal or insertion of module. All identical module chassis of same size shall be fully interchangeable without having to carryout any modifications.

- 3.15 All disconnecting contacts for power and control circuits of draw-out modules shall be of robust and proven design, fully self-aligning and spring-loaded. Both fixed and moving contacts shall be silver-plated and replaceable. The spring-loaded power and control draw-out contacts shall be on withdraw-able chassis and same on fixed portion shall not be accepted. Detachable plug and socket type control terminals shall also be acceptable.
- 3.16 Individual opening in the vertical bus enclosure shall permit the entry of moving contacts from the draw-out module into vertical droppers.
- 3.17 All equipments and components shall be neatly arranged and shall be easily accessible for operation and maintenance. The internal layout of all modules shall be subject to Purchaser's approval. The Contractor shall submit dimensional drawings showing complete internal details of busbars and module components, for each type and rating for approval of Purchaser.
- 3.18 However, the Purchaser reserves the right to alter the cable entries top or bottom, if required, during detailed engineering, without any additional commercial implication.
- 3.19 Each switchboard shall be provided with undrilled, removable type gland plate which shall cover the entire cable alley. Bidder shall ensure that sufficient cable glanding space is available for all the cables coming in a particular section through gland plate. For all single core cables, gland plate shall be of non-magnetic material. The gland plate shall preferably be provided in two distinct parts for the ease of terminating additional cables in future. The gland plate shall be provided with gasket to ensure enclosure protection.
- 3.20 The composition and disposition of various modules in a switchboard shall be finalized during detailed engineering. The Bidder shall include in his quoted price the cost of any adopter panel/dummy panel required to meet various configuration arrangement of busbars adopted by the Bidder.

3.21 **Clearances**

The minimum clearance in air between phases and between phases and earth for the entire run of horizontal and vertical busbars and bus-link connections at circuit-breaker shall be 25 mm. For all other components the clearance between 'two live parts', 'a live part and an earthed part', shall be atleast 10 mm throughout. Wherever it is not possible to maintain these clearances, the insulation shall have to be provided by sleeving or barriers. However, for horizontal and vertical busbars, the clearances specified above should be maintained even when the busbars are sleeved or insulated.

All connections from the busbars up-to switch/fuses shall be fully shrouded/insulated and securely bolted to minimise the risk of phase to phase and phase to earth short circuits.

4. POWER BUSBARS AND INSULATORS

- 4.1 All 415 V Switchboards, MCCs and ACDBs shall be provided with three phase and neutral busbars.
- 4.2 All busbars and jumper connections shall be of high conductivity aluminium alloy/copper of adequate size.
- 4.3 The cross-section of the busbars shall be uniform throughout the length of switchboard and shall be adequately supported and braced to withstand the stresses due to the specified short circuit currents. Neutral busbar short circuit strength shall be same as main busbars.
- 4.4 All busbars shall be adequately supported by non-hygroscopic, non-combustible, track-resistant and high strength sheet moulded compound or equivalent type polyester fibre glass moulded insulators. Separate supports shall be provided, for each phase and neutral busbar. If a common support is provided, anti-tracking barriers shall be provided between the supports. Insulator and barriers of inflammable material such as Hylam, shall not be accepted. The busbar insulators shall be supported on the main structure.
- 4.5 All busbar joints shall be provided with high tensile steel bolts, belleville/spring washers and nuts, so as to ensure good contacts at the joints. Non-silver plated busbar joints shall be thoroughly cleaned at the jointed locations and suitable contact grease shall be applied just before making a joint. The overlap of the busbars at each joint surface shall be such that the length of overlap shall be equal to or greater than the width of the busbar. All copper to aluminum joints shall be provided with suitable bi-metallic washers.
- 4.6 All busbars shall be color coded as per IS : 375.
- 4.7 Wherever the busbars are painted with black matt paint, the same should be suitable for temperature encountered in the switchboard under normal operating conditions.
- 4.8 The Bidder shall furnish calculations establishing the adequacy of busbar sizes for specified current ratings.
- 4.9 The neutral bus in MCC shall be connected to earth bus at two points by separate vertical droppers which shall be insulated from MCC enclosure. The neutral bus shall not be earthed in all the other boards in which incomers are not from transformers.

5. AUXILIARY BUSBARS AND CONTROL TRANSFORMERS

5.1 AC Control Supply Bus bar

Each bus-section of all Switchgears and MCCs shall be provided with one (1) no. 415 V/110V control transformer as shown in enclosed Drawing. The 110 V AC control supply from the control

transformers shall be run through the MCC by means of two sets of control supply busbars of electrolytic copper. In case of failure of one transformer, whole bus section can be fed through single transformer. The control supply to different modules shall be tapped individually from the control supply busbars. One pole of the secondary winding of these control transformers shall be solidly grounded through a test link. The transformer body shall be earthed at two points.

5.2 **DC Control Supply Bus bars**

For PLC based control system, DC supply to PLC unit including relays shall be provided with one (1) no. of 415 V/220V control transformer with inverter unit in each section of the MCC. The Bidder shall provide suitable terminals, switch etc. to receive the DC supply and distribute the same through above mentioned control busbars to the required modules of the respective section. The DC control supply bus of one section shall be coupled to the control supply of other section through a switch located in the bus-coupler breaker panel. The DC supply to the bus-coupler breaker may be given from any of the control buses.

5.3 **Space Heater Busbars**

Panel and motor space heaters shall be fed from separate AC auxiliary busbars running throughout the switchboard. The supply for these busbars shall be tapped from incomers before the isolating switch/circuit breaker. Incoming circuit to space-heater bus shall have an isolating switch, HRC fuse and neutral link of suitable rating. Suitable terminals shall also be provided to facilitate energisation of space-heater bus from outside during long shutdowns of unit/switchboard.

5.4 **Control Transformers**

The control transformers shall be dry type, of insulation class B or better. The sizing of Control transformers shall be carried out by Bidder considering the actual load of power contactors, auxiliary contactors, indicating lamps and other equipments in the module circuit. An additional load of 15 watts should also be considered for each module, for remote auxiliary relays and lamps to be connected in the control circuit of modules. Bidder shall also ensure that control transformers are adequately designed for meeting the momentary loading requirements and the voltage drop during this condition shall not be more than 5%.

6. **EARTH BUS AND EARTHING**

6.1 A galvanised steel earth bus shall be provided at the bottom of each panel and shall extend throughout the length of each switchboard. It shall be welded/bolted to the framework of each panel and breaker earthing contact bar. Vertical earth bus shall be provided in each vertical section which shall in turn be bolted/welded to main horizontal earth bus.

6.2 The earth bus shall have sufficient cross section to carry the momentary short circuit and short time fault current to earth, without exceeding the allowable temperature rise.

6.3 Suitable arrangements shall be provided at each end of the horizontal earth bus for bolting to

earthing conductors. The horizontal earth bus shall project out of the switchboard ends and shall have predrilled holes for this connection. All joint splices to earth bus shall be made through at-least two bolts and taps by proper lug and bolts connection.

- 6.4 All non-current carrying metal work of the switchboard shall be effectively bonded to the earth bus. Electrical conductivity of the whole switchgear enclosure framework and truck shall be maintained even after painting.
- 6.5 The carriage and breaker frame shall get earthed while being inserted in the panel and positive earthing of the breaker frame shall be maintained in all positions, i.e. SERVICE & ISOLATED, as well as the throughout the intermediate travel.
- 6.6 Each module frame shall get engaged to the vertical earth bus before the disconnecting contacts on the module are engaged to the vertical busbars.
- 6.7 All metallic cases of relays, instruments and other panel-mounted equipments shall be connected to earth by independent stranded copper wire of size not less than 2.5 sq. mm. All the equipment mounted on the door shall be earthed through flexible wire/braids. Insulation color code of earthing wires shall be green. Earthing wires shall be connected to terminals with suitable clamp connectors, soldering is not acceptable. Looping of earth connections which would result in loss of earth connections to other devices, when a device is removed, is not acceptable. However, looping of earth connections between equipments to provide alternative paths to earth bus is acceptable.
- 6.8 VT and CT secondary neutral point earthing shall be at one place only, i.e., on the terminal block. Such earthing shall be made through links so that earthing of one secondary circuit shall be removed without disturbing the earthing of other circuit.
- 6.9 All hinged doors having potential carrying equipment mounted on it shall be earthed by flexible wire/braid. For doors not having potential carrying equipment mounted on it, earth continuity through scraping hinges/hinge pins of proven design may also be acceptable. The Bidder shall establish earth continuity at site also.

7. **CIRCUIT BREAKERS**

- 7.1 Circuit breakers shall be three pole, air break, horizontal draw-out type, and shall have fault making and breaking capacities. The operating duty shall be O-3 min-CO-3 min-CO.
- 7.2 Circuit breakers along-with its operating mechanism shall be provided with suitable arrangement for easy withdrawal.
- 7.3 There shall be "SERVICE", "TEST" and "ISOLATED" positions for the breakers. Locking facilities shall be provided so as to prevent movement of the circuit breaker from the "SERVICE", "TEST" or "ISOLATED" position. It shall be possible to close the door in "TEST" position.
- 7.4 All circuit breakers shall have short circuit releases and shunt trip coil irrespective of the type of

operating mechanism.

- 7.5 All circuit breakers shall be provided with "4 NO" and "4 NC" potential free auxiliary contacts. These contacts shall be in addition to those required for internal mechanism of the breaker and should be directly operated from breaker operating mechanism.
- 7.6 Suitable mechanical indications shall be provided on all circuit breakers to show "OPEN", "CLOSE", "SERVICE", "TEST" and "SPRING CHARGED" positions.
- 7.7 All circuit breakers shall be provided with the following interlocks :
- i) Movement of a circuit breaker between "SERVICE" and "TEST" position shall not be possible unless it is in open position.
 - ii) Closing of a circuit breaker shall not be possible unless it is in "SERVICE" position, "TEST" position or in "ISOLATED" position.
 - iii) Circuit-breaker cubicles shall be provided with safety shutters operated automatically by the movement of the circuit breaker carriage to cover the stationary isolated contacts when the breaker is withdrawn.
 - iv) A breaker of particular rating shall be prevented from insertion in a cubicle of a different rating.
 - v) Circuit breakers shall be provided with coded key/electrical interlocking devices.
- 7.8 Circuit breaker shall be provided with electrical anti-pumping and trip free feature even if mechanical anti-pumping feature is provided.
- 7.9 Mechanical tripping shall be possible by means of front mounted Red trip push button. In case of electrically operated breakers these push buttons shall be shrouded to prevent accidental operation.
- 7.10 Means shall be provided to slowly close the circuit breaker in "ISOLATED", if required, for inspection and setting of contacts.
- 7.11 Complete shrouding/segregation shall be provided between incoming and outgoing bus links of breakers. In case of bus coupler breaker panels the busbar connection to and from the breaker terminals shall be segregated such that each connection can be approached and maintained independently with the other bus section live. Dummy panels if required to achieve the above feature shall be included in the Bidder's scope of supply.
- 7.12 Circuit breaker shall be provided with following mechanism:
- 7.12.1 **Power Operated Mechanism**
- i) Power operated mechanism shall be provided with a universal motor suitable for operation on 110V AC Control supply, with voltage variation from 85% to 110% rated voltage. Motor insulation shall be class "E" or better.
 - ii) The motor shall be such that it requires not more than 30 seconds for fully charging the closing spring at minimum available control voltage.

- iii) Once the closing springs are discharged, after one closing operation of circuit breaker, it shall automatically initiate recharging of the spring.
- iv) The mechanism shall be such that as long as power is available to the motor, a continuous sequence of closing and opening operations shall be possible. After failure of power supply at least one open-close-open operation shall be possible.
- v) Provision shall be made for emergency manual charging and as soon as this manual charging handle is coupled, the motor shall automatically get mechanically decoupled.
- vi) All circuit breakers shall be provided with closing and trip coils. The closing coil shall operate correctly at all values of voltage between 85% to 110% of rated control voltage. The trip coil shall operate satisfactorily at all values of voltage between 70% to 110% of rated control voltage.
- vii) Provision for mechanical closing of the breaker only in "TEST" and "ISOLATED" positions shall be made.

7.13 **Telescopic Trolley**

One (1) Telescopic trolley shall be provided for maintenance of circuit-breaker module in a cubicle. The trolley shall be such that the topmost breaker module can be withdrawn on the trolley and can be lowered for maintenance purpose. The telescopic trolley shall be such that all type, size and rating of breaker can be withdrawn/inserted of particular switchgear.

8. **MOULDED CASE CIRCUIT BREAKERS**

This specification covers requirements for 415V Moulded Case Circuit Breakers suitable for installation in a switchboard (MCC).

The Moulded case circuit breakers shall comply with the latest revision of IS: 13947(Part I) and IEC: Publication 947 except where modified or extended by the provision of this specification and with the relevant parts of standards mentioned in clause 1.2.

Any material and component not specifically stated in this specification but necessary for trouble free operation of the equipment and accessories specified herein shall deemed to be included.

8.1 **DESIGN CRITERIA**

The Moulded Case Circuit Breakers shall operate on a 415 V (-10% to + 10%), 3 phase, 50 Hz (+/- 3%) power supply. Fault withstand capacity shall not be less than 50 kA (P1 category duty cycle).

All similar components shall be interchangeable and shall be of same type and rating for easy maintenance and low spare inventory.

The rated carrying capacity shall be as specified in annexure-I at the rated voltage and frequency and the circuit breaker shall carry this current continuously while complying with this specification.

8.2 **CONSTRUCTIONAL DETAILS**

- 1) The Circuit breakers shall be three / four pole, moulded case air break type.

- 2) The circuit breakers shall have tripping mechanism for over load and short circuit irrespective of the type of operating mechanism. In addition, provision shall be made for manual tripping of the breaker. The breakers shall be fixed type.
- 3) Circuit Breakers shall be provided with anti-pumping and trip free feature.
- 4) Tripping shall be possible by means of front mounted "OFF" switch. Making of the breaker shall be possible by means of "ON" switch.
- 5) Suitable arc splitters and magnetic blowouts and chutes shall be provided for efficient arc extinction of high as well as low values of interrupting currents.
- 6) Suitable indications shall be provided on circuit breaker to show "ON", "OFF", conditions.
- 7) The following protection (release type) shall be provided :
 - a) Ambient temperature compensated thermal overload trip with adjustable settings.
 - b) Magnetic Short circuit trip

8.3 **PERFORMANCE**

- 1) The temperature rise of parts of the equipment like terminals, accessible parts, main circuit, windings of coils and electromagnets etc. measured during the test carried out in accordance with IS: 13947 (Part I) shall not exceed temperature rise limits specified in the said standard.
- 2) The dielectric property of the equipment shall conform to co-ordination of insulation related to insulation levels indicated in IS: 13947 (Part I).
- 3) Clearances shall be sufficient to enable the equipment to withstand the rated withstand voltage as indicated in the IS: 13947 (Part I).
- 4) The minimum creepage distance shall be as per IS: 13947 (Part I).
- 5) The equipment shall be capable of making and breaking load and overload currents without failure under the conditions stated in the relevant product standard for the required utilisation category.
- 6) The equipment shall be capable of withstanding thermal and electromagnetic stress from short circuit currents during current making, current carrying in the closed position and during current interruptions.

9. **AIR BREAK SWITCHES**

- 9.1 Air break switches shall be of heavy duty, single throw, group operated, load break, fault make type when associated with fuses and complying with IS:4064. All switches for motor circuits shall be of utilisation category AC-23 with INO+INC auxiliary contact which shall be wired to the control circuit as shown in the schematic drawings. All switches for other outgoing feeders shall be of utilisation category AC-22.

- 9.2 Continuous current rating of the switches shall be selected for various feeders.
- 9.3 The main switches shall be operable from outside the module door. The switch handle shall clearly indicate the position of switch. Switch operating handles shall be provided with padlocking facilities to lock them in "OFF" position. However, incomer switches of switchboards shall be provided with padlocking facility in both "ON" and "OFF" positions.
- 9.4 Interlocks shall be provided such that the cubicle door will not open when the switch is in closed position and the switch will close only when the door is closed.
- 9.5 Switches and fuses for AC control supply and heater supply wherever required, shall be mounted inside the cubicles.
- 9.6 Even for a single feeder the Bidder shall provide TPN switch, fuse-bases and cable/link connections between switch/fuse and vertical busbars for all the three phases, so that changing from single phase feeder to three phase feeder is possible without any modification other than inserting fuses at site.
10. **CONTROL AND SELECTOR SWITCHES**
- 10.1 Control and Selector switches shall be of rotary type, with escutcheon plates clearly marked to show the function and positions. The switches shall be suitable for mounting on panel front.
- 10.2 Circuit breaker control switches shall have three positions and shall be spring return to "NEUTRAL" from "CLOSE" and "TRIP" positions and shall have pistol grip handles. The control switch shall have at least two (2) contacts closing in 'Close' position, and two (2) contacts closing in 'Trip' position.
- 10.3 Circuit breaker selector switches for motor feeders shall have three stay put positions marked "Switchgear", "Normal" and "Trip" respectively. They shall have at least three contacts for each of the three positions and shall have black spade handles. Circuit breaker selector switches for other feeders shall have two stay put positions marked "Switchgear" and "Normal" with two contacts for each of the two positions.
- 10.4 Ammeter and voltmeter selector switches shall have four stay put positions with adequate number of contacts for 3-phase 4-wire system. Ammeter selector switches shall have make before break type contacts to prevent open circuit of CT secondary.
- 10.5 Contacts of the switches shall be spring assisted.
- 10.6 The contact ratings shall be at least the following :
- i) Make and carry, continuously 10 A, 110 V AC.
 - ii) Breaking current at 110 V AC and 0.3 lagging p.f., 5A.
11. **CONTACTORS**
- 11.1 Motor starter contactors shall be of air break, electro-magnetic type rated for uninterrupted duty as per IS :2959.

- 11.2 Contactors shall be double-break, non-gravity type and their main contacts shall be silver faced.
- 11.3 Direct-on-line contactors shall be of utilisation category AC3. Reversing starters shall comprise of Forward and Reverse contactors mechanically and electrically interlocked with each other. These contactors shall be of utilization category AC4.
- 11.4 The number of normally open (NO) and normally closed (NC) auxiliary contacts of a contactor shall be as per requirement shown in the respective module drawings. It shall, however, be not less than 2 NO+2NC.
- 11.5 Operating coil of contactors shall be of 110 V AC unless otherwise specified elsewhere. The contactor shall operate satisfactorily between 85% to 110 % of the rated voltage. The contactor shall not drop out at 70% of the rated voltage but shall definitely drop out at 20% of the rated voltage.

12. **FUSES**

- 12.1 All fuses shall be of HRC cartridge fuse link type. Fuses for AC circuits shall be rated for 80 KA rms (prospective) breaking capacity at 415 V AC.
- 12.2 Fuse shall have visible operation indicators. Insulating barriers shall be provided between individual power fuses.
- 12.3 Fuse shall be mounted on insulated fuse carrier which is mounted on fuse bases. Wherever it is not possible to mount fuses on carriers, fuses shall be directly mounted on plug - in type of bases. In such cases one set of insulated fuse pulling handles shall be supplied with each switchboard.
- 12.4 Fuse ratings shall be selected by the Bidder for various feeders.
- 12.5 The Neutral links shall be mounted on fuse carriers which shall be mounted on fuse bases.

13. **INSTRUMENT TRANSFORMERS**

- 13.1 All current and voltage transformers shall be completely encapsulated cast resin insulated type suitable for continuous operation at the temperature prevailing inside the switchgear enclosure, when the switchboard is operating at its rated condition and the specified ambient temperature. The class of insulation shall be 'E' or better.
- 13.2 All instrument transformers shall be able to withstand the thermal and mechanical stresses resulting from the maximum r.m.s short circuit breaking and peak making current ratings of the associated switchgear.
- 13.3 All instrument transformers shall have clear indelible polarity markings. All secondary terminals shall be wired to separate terminals on an accessible terminal block where star point formation and earthing shall be done.
- 13.4 Current transformers may be multi or single core type. All voltage transformers shall be single phase type.
- 13.5 The bus VTs shall be housed in separate compartment. All VTs shall have readily accessible HRC

current limiting fuses on both primary and secondary sides.

13.6 All CTs shall be provided with supports independent of busbar / busbar supports.

13.7 The metering CTs shall be of Class 1 accuracy and adequate VA burden. The Protection CTs shall be of 5P₁₀ accuracy class with adequate burden.

14. **RELAYS & TIMERS**

14.1 All relays and timers in protective circuits shall be flush mounted on panel front with connections from the inside. They shall have transparent, dust tight covers removable from the front. All protective relays shall have a draw-out construction for easy replacement from the front. They shall either have built in test facilities or shall be provided with necessary test blocks and test switches located immediately below each relay.

14.2 All AC relays shall be suitable for operation at 50 Hz with 110 Volt VT secondary and 1A or 5A CT secondary.

14.3 Protective relays, auxiliary relays and timers shall be provided with hand reset operation indicators.

14.4 All relays shall withstand a test voltage of 2.5 KV AC rms for one second or 2 KV AC rms for one minute. The accuracy class shall be 5 of IS : 3231.

14.5 All fuse protected contactor controlled motor and actuator starters shall be provided with three element, ambient temperature compensated, time lagged, hand reset type thermal overload relays with single phasing protection using differential movement and bimetallic strips. The single phasing protection shall operate even with 100% of the set current flowing in two of the phases and no current in the third phase. The setting ranges shall be adjustable type. These relays shall have a separate hand reset push button mounted on compartment door and shall have at-least one changeover contact. Heavy duty starting overload relays shall be provided for modules controlling motors with long starting time. The requirement shall be finalised during detailed engineering.

14.6 All releases in circuit breakers shall conform to IS:13947. The releases shall be instantaneous or time delayed as per the requirement mentioned in module description. The releases shall have an operation indicator. The instantaneous release used for motor feeders shall be co-coordinated such that it does not operate with motor starting current.

14.7 The DC auxiliary relays for PLC system shall be designed for 220 V DC unless otherwise specified and shall operate satisfactorily between 75% and 110 % of the rated voltage. Relays shall have adequate thermal capacity for continuous operation. For PLC-controlled modules the coupling relays shall be provided by Bidder. The other parameters of these relays shall be same as Cl. no. 13.4 except for peak inverse voltage of diode which will be twice the rated voltage of coil.

15. **INDICATING INSTRUMENTS**

15.1 All indicating and integrating meters shall be flush mounted on panel front. The instruments shall be

of at least 96 mm. square size with 90 degree linear scales, and shall have an accuracy class of 2.0 or better. The covers and cases of instruments and meters shall provide a dust and vermin proof construction.

15.2 All instruments shall be compensated for temperature errors and factory calibrated to directly read the primary quantities. Means shall be provided for zero adjustment without removing or dismantling the instruments.

15.3 All instruments shall have white dials with black numerals & lettering. Black knife edge pointer shall be provided for meters.

15.4 Ammeters provided for motor feeders shall have a compressed scale at the upper current region to cover the starting current upto 6.0 times the CT primary current.

16. **PUSH BUTTONS**

16.1 Push buttons shall be of spring return, push-to-actuate type. Their contacts shall be rated to make, continuously carry and break 10 A at 110 V AC.

16.2 All push buttons shall have one normally open and one normally closed contact unless specified otherwise. The contact faces shall be of silver alloy.

16.3 All push buttons shall be provided with integral escutcheon plates marked with its function.

16.4 The colour of the button shall be as follows :

Green for motor START, breaker CLOSE, commands.

Red for motor TRIP, breaker OPEN, commands

Black for all annunciation functions, overload, reset and miscellaneous commands including reversal

16.5 All emergency push buttons shall have mushroom knobs.

17. **INDICATING LAMPS**

17.1 Indicating lamps shall be of the panel mounting, LED/filament type and low watt consumption. The lamps shall have escutcheon plates marked with its function wherever necessary.

17.2 Lamps shall have translucent lamp-covers of the following colors, as warranted by the application.

Red for motor ON, valve/damper OPEN, breaker CLOSE

Green for motor OFF, valve/damper CLOSE, breaker OPEN

White for motor AUTO TRIP

Blue for all healthy conditions (e.g. CONTROL SUPPLY ON, and also for "SPRING CHARGED")

Amber for all Alarm Conditions (e.g. overload). Also for "SERVICE" and "TEST" position indications.

17.3 Bulbs and lamp covers shall be easily replaceable from the front of the cubicle.

17.4 All indicating lamps shall be suitable for continuous operation at 90% to 110% of their rated

voltage.

18. **SPACE HEATER**

- 18.1 Space heaters shall be provided in the switchboards wherever the manufacturer considers them necessary and recommends their provision for preventing harmful moisture condensation.
- 18.2 The space heaters shall be suitable for continuous operation on 240 V AC, 50 Hz, single phase supply and shall be automatically controlled by thermostats. Necessary switches and fuses shall also be provided.
- 18.3 The circuit for each panel and motor space heater should have an isolating switch, HRC fuse and isolating link. In addition, the space heater circuit of each panel shall also have a thermostat of suitable rating.

19. **INTERNAL WIRING**

- 19.1 All switchboards shall be supplied completely wired internally up-to the terminals ready to receive external cables.
- 19.2 All inter-cubicle and inter-panel wiring and connections between panels of same switchboard including all bus wiring for AC supplies shall be provided by the Bidder.
- 19.3 All auxiliary wiring shall be carried out with 650 V grade, single core, stranded copper conductor, color coded, PVC insulated wires. Conductor size shall be 1.5 mm² (min.) for control circuit wiring and 2.5 mm² (min.) for CT and space heater circuits.
- 19.4 Engraved core identification ferrules marked to correspond with panel wiring diagram shall be fitted at both ends of each wire. The ferrule shall be of self locking type. The wire identification marking shall be in accordance with IS: 375.
- 19.5 Wiring for equipment, which are to be supplied by the Purchaser/Other Contractor and for which the Contractor has to provide mounting arrangement in his panels, shall also be provided by the Contractor, upto the terminal blocks.
- 19.6 All connections from vertical busbars for individual modules above 100 A shall be by Copper links only. The cable connections for modules less than 100A shall be selected in such a way that there will not be any melting/shorting in case of a short circuit inside the module. For all modules where use of cable is envisaged by the Contractor specific approval from the Purchaser regarding cable details are to be taken. For power wiring color coded wire insulation/tapes shall be provided.

20. **CONTROL TERMINAL BLOCKS**

- 20.1 Control terminal blocks shall be of 650 Volts grade, rated for 10 Amps and in one piece moulding. It shall be complete with insulating barriers, clip-on type terminals and identification strips. Marking on terminal strip shall correspond to the terminal numbering on wiring diagrams. It shall have insulating material conforming to relevant code.
- 20.2 Terminal blocks for CT & VT secondary leads shall be provided with test links and isolating

facilities. CT secondary leads shall be provided with short circuit and earthing facilities.

- 20.3 In all circuit breaker panels at least 10% spare terminals for external connections shall be provided and these spare terminals shall be uniformly distributed on all terminal blocks.
- 20.4 All terminal blocks shall be suitable for terminating on each side two (2) nos. stranded copper conductors of size up-to 2.5 mm² each.
- 20.5 All terminals shall be numbered for identification and grouped according to the function. Engraved white-in-black labels shall be provided on the terminal blocks.
- 20.6 Terminal blocks shall be arranged with at-least 100 mm clearance between two sets of terminal blocks. The minimum clearance between the first row of terminal blocks and the associated cable gland plate shall be 250 mm.

21. **POWER CABLE TERMINATION**

- 21.1 Cable termination compartment and arrangement for power cables shall be suitable for heavy duty, 1.1 KV grade, stranded aluminium conductor, PVC/XLPE insulated, armoured and PVC sheathed cables. All necessary cable terminating accessories such as supporting clamps and brackets, power cable lugs, hardware etc. shall be provided by the Bidder to suit the cable sizes.
- 21.2 All power cable terminals shall be of stud type and the power cable lugs shall be of tinned copper solder less crimping ring type conforming to IS: 8309. All lugs shall be insulated/sleeved.

22. **NAME PLATES AND LABELS**

- i) The MCC shall be provided with prominent, engraved identification plates. The module identification plate shall clearly indicate the feeder number and feeder designation as indicated elsewhere.
- ii) The name plates shall be of non rusting metal with white non graved letterings on black back grounds. Inscriptions and lettering sizes shall be subject to purchaser's approval.
- iii) Suitable stenciled paint mark shall be provided in side the panel /module for identification of all equipments in addition to the plastic sticker labels, if provided. The labels shall be positioned so as to be clearly visible. The labels shall bear the device number as indicated in the approved module wiring drawing.
- iv) Caution plate with the inscription "WARNING LIVE TERMINALS" shall be provided at all joints where the terminals are likely to remain live and isolation is possible only at remote end.

23. **PAINTING**

The sheet steel work shall be pre treated, in tanks, in accordance with relevant code. Finishing paint on panels shall be shade 692 (smoke grey) in accordance with relevant code. The inner surface of the panels shall be glossy white. All hardware shall be nickel chromium plated or zinc passivated.

24. **GASKETS**

The gaskets wherever specified shall be of good quality synthetic rubber with good ageing, compression and oil resistant characteristic suitable for panel application.

25. **PERFORMANCE**

25.1 **TEMPERATURE-RISE**

The temperature rise of the horizontal and vertical busbars and main bus links including all power draw out contacts when carrying 90% of the rated current along the full run shall in no case exceed 55⁰C with silver plated joints and 40⁰C with all other types of joints over the specified ambient temperature.

25.2 **DERATING OF EQUIPMENTS**

- i) The Bidder shall ensure that the equipment offered carry the required load current at specified ambient temperature and perform the operating duties without exceeding the permissible temperature as per relevant code. Continuous current rating at specified ambient temperature shall in no case be less than 90% of the normal rating specified.
- ii) The Bidder shall indicate clearly the derating factors, if employed for any component and furnish the basis for arriving at these derating factors duly considering the specified current ratings and ambient temperature specified.

25.3 **PROTECTION CO-ORDINATION**

It shall be the responsibility of the Bidder to fully co-ordinate the overload and short circuit tripping of the circuit breakers with the upstream and downstream circuit breakers/fuses/motor starters, to provide satisfactory discrimination. Further the various equipment supplied shall meet the requirements of Type C class of Co-ordination as per IEC 292.

A) **Module Type AE (Electrically Controlled Circuit Breaker)**

- One (1) Triple-pole circuit breaker, complete with all accessories and power operated mechanism
- One (1) Circuit breaker control switch
- Three (3) Current transformers for metering
- Three (3) Current transformers for protection
- One (1) Ammeter
- One (1) Ammeter selector switch
- One (1) 'Switchgear'/'Normal' selector switch
- Three (3) Indicating lamps with resistors and colored lenses
- Six (6) HRC Control fuses
- One (1) Lock out relay
- One (1) Suitable time delayed over current release. Alternatively, over current definite time delay relay with adjustable current setting 150% to 600% of the CT secondary current and adjustable time setting 0.1 Sec to 1 Sec may be offered .The relay shall have a resetting ratio of not less than 90%.
- One (1) Neutral link
- One(1) DC isolating switch

B) **Module Type AET (Electrically Controlled Circuit Breaker for Incomer from Transformer)**

Similar to module type AE but with following additions :

- One (1) Neutral current transformer for earth fault protection
- One (1) Single pole instantaneous earth fault relay with adjustable current setting of 50%-200% of rated secondary current of neutral CT. The relay shall have a resetting ratio of not less than 80%.

C) **Module Type CD (Contactor Changeover with Bus Coupler and Two Incoming Supplies)**

(Note : Incomer-A, Incomer-B and Bus Coupler shall be housed in separate drawout modules in different panels. Each of the drawout modules shall be provided with 'Service' position limit switch having 2 NO+2NC contacts).

Incomer-A / Incomer-B

- One (1) Triple pole load break isolating switch
- One (1) Triple pole contactor with coil suitable for 415 VAC
- Two (2) Auxiliary contactors with coil suitable for 415 V AC
- One (1) Indicating lamp with resistor & colored lens suitable for 415 V AC

Three (3) HRC control fuses

Bus Coupler

One (1) Triple pole contactor with coil suitable for 415 V AC

Three (3) HRC fuses

Four (4) HRC control fuses

Two (2) Monitoring lamps suitable for 415 V AC

D) **Module Type CS (AC Control Supply Module)**

(Note : Module Type CS shall be of non-drawout type)

Two (2) 415 V /110 V control transformers

Two (2) 110 V auxiliary relays

Two (2) Earth links

Eight (8) HRC Control fuses

Two (2) Selector switches

E) **Module Type E/E1/E2 (Switch Fuse Module)**

One (1) Triple pole switch-fuse unit with three pole isolating switch and three/one/two HRC fuses for E/E1/E2 modules, respectively

One (1) Neutral link

F) **Module Type G1 (PT Module with Under Voltage Relay)**

Two (2) 440/110 V single phase potential transformers, vee/vee connected, mounted on a common draw-out chassis

Four (4) HRC fuses for PT primary

One (1) Voltmeter (0-500 V for use with 440/110 V PT)

One (1) Four position voltmeter selector switch

Two (2) Single pole, instantaneous under voltage relays with continuously variable setting range of 40%-80% of 110 volts.

Four (4) HRC control fuses

One(1) Timer having a delay of 0.5 Sec to 3 Sec on pick up with 2 NO self reset contacts suitable for 220 V DC .

G) **Module Type H (Isolating Switch Module)**

One (1) Triple pole load break isolating switch

One (1) Neutral link

H) **Module Type KI (Non Reversible Motor Rated Below 30 KW Controlled from MCC)**

One (1) Triple pole fuse switch unit with three pole load break isolating switch and three HRC fuses.

One (1) Triple pole contactor

One (1) Bimetallic thermal overload relay with single phasing preventor

- Two (2) Push buttons
 - Three (3) Indicating lamps with resistors and colored lenses
 - One (1) HRC control fuse
 - One (1) Control link
- I) **Module Type K11 (Non reversible Motor Rated 30 KW to below 110 KW Controlled from MCC)**
- Similar to module type K1 but with the following additions*
- One (1) Current transformer for metering
 - One (1) Ammeter
 - One (1) Single -pole switch and fuse for motor space heater
- J) **Module Type K2 (Non Reversible Motor Rated below 30 KW Controlled from Remote Control Panel)**
- One (1) Triple pole switch fuse unit with three pole load break isolating switch and three HRC fuses.
 - One (1) Triple pole contactor
 - One (1) Bimetallic thermal overload relay with single phasing preventor
 - Three (3) Indicating lamps with resistors and colored lenses
 - One (1) HRC Control fuse
 - One (1) Control link
 - One (1) 'Normal' / 'Trial' selector switch
 - One (1) Auxiliary contactor
- K) **Module Type DK2 (Non Reversible Motor Rated Below 30 KW Controlled from PLC)**
- (Similar to module type K2 without 'Normal'/'Trial'/' selector switch but with two (2) coupling relays.)*
- L) **Module type K2/DK21 (Non Reversible Motor Rated 30 KW to below 110 KW Controlled from Remote Control Panel/PLC)**
- (Similar to module type K2/DK2 but with the following additions)*
- One (1) Current transformer for metering
 - One (1) Ammeter
 - One (1) Single-pole switch and fuse for motor space heater
- M) **Module Type K3 (Non Reversible Motor Rated Below 30 KW Controlled Locally)**
- One (1) Triple pole fuse switch unit with three pole load break isolating switch and three HRC fuses.
 - One(1) Triple pole contactor
 - One (1) Bimetallic thermal overload relay with single phasing preventor

- Three (3) Indicating lamps with resistors and colored lenses
 - One (1) HRC control fuse
 - One (1) Control link
- N) **Module Type K31 (Non Reversible Motor 30 KW to below 110 KW controlled locally)**
(Similar to module type K3 but with the following additions)
- One (1) Current transformer for metering
 - One (1) Ammeter
 - One (1) Single pole switch and fuse for motor space heater
- O) **Module Type NI (Reversible Motor Controlled from Remote Panel)**
- One (1) Triple pole fuse switch unit with three pole load break isolating switch and three HRC fuses.
 - Two (2) Triple pole mechanically interlocked, forward and reverse contactors.
 - One (1) Bimetallic thermal over load relay with single phasing preventor.
 - One (1) 'Normal' / 'Trial' selector switch.
 - One (1) Indicating lamp with resistor and colored lens.
 - One (1) HRC control fuse
 - One (1) Control link
- P) **Module Type DN1 (Reversible Motor Controlled from PLC)**
- One (1) Triple pole fuse switch unit with three pole load break isolating switch and three HRC fuses.
 - Two (2) Triple pole mechanically interlocked, forward/reverse contactors.
 - One (1) Bimetallic thermal overload relay with single phasing preventor.
 - One (1) Indicating lamp with resistor and colored lens.
 - One (1) HRC control fuse
 - One (1) Control link
 - One (1) Auxiliary contactor
 - Two (2) Coupling relays

TECHNICAL INFORMATION

1	Applicable Standard	IS 8623
2	Enclosure	Single Front
3	Protection of Enclosure	IP52 for indoor
4	Location	Indoor
5	Rated voltage	415 V
6	Rated control voltage	110 V AC
7	Bus Bar system	TPN , Aluminium
8	Bus Bar rating	As Required
9	Short time rating	50 kA for 1 Sec
10	Power frequency withstand voltage	2.5 kV for 1 min for Bus Bars & Breakers , Switches & Contactors 2 kV for 1 min for Relays , Timers , Transformers
11	Interrupting capacity of breakers	P1 for MCCB & P2 for ACB
12	Duty of power contactors	AC 3 for non reversible & AC 4 for reversible
13	Duty of auxiliary contactors	AC 1
14	Category of switches	AC 23 for fuse switches & AC 22 for auxiliary devices
15	Type of HRC fuses	Current limiting
16	Rating of HRC fuses	50 kA
17	Type of control transformer	Dry type, 415/220 V and 415/110 V of adequate rating
18	Type of potential transformer	Dry type, 415/110 V of adequate rating
19	Cabling for power circuits	Cable alley for external cables , Modules for internal cables below 70 mm ² & in separate cable chamber for 70 mm ² and above
20	Cable entry	Bottom/Top
21	Cabling for control circuits	1.5 mm ² , 660 V PVC
22	Earthing	Main Bus- Aluminium 300 mm ² and Vertical Bus- 150 mm ²
23	Dimension of a single panel	As required subject to Purchaser's approval
24	Paint & Finish	Panel outer surface- Smoke Grey Panel inner surface -glossy White

		Chassis- Zinc passivated Command module-Aluminum anodised Name plate-Non rusting material Lettering-White non graved on black back ground
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SPECIFICATION FOR CONTROL PANELS FOR PLC & OTHER SYSTEM REQUIREMENT

1. SCOPE

This covers requirements for Control Panel for PLC and other system requirement in accordance with IS 8623.

The entire Plant control system shall be controlled by a Programmable Logic Controller (PLC) based distributed control system. The system integrates with a suite of programs running on PC to provide the operator with a comprehensive window to all aspects of the plant operation. The computer software shall provide a data acquisition system whereby all digital or analog variables entered into the system can be logged or achieved for future analysis . This allows process variables to be trended over a long period of time (typically one month) and all alarms occurring to be date and time stamped as they occur .Additionally , the logging of all motor starts and run-time intervals shall provide maintenance personnel with a powerful tool in predicting meantime before failure of all motors and ancillary equipment.

A second PLC and computer shall be provided as back-up , in case of failure of the primary unit. The back-up unit shall be preloaded with the operating software such that a fast changeover can be accomplished.

The operator's console shall be rugged industrially hardened housing for the PLC processor and the computers. All inputs by the operator as necessary to run the plant shall be via industrial water proof and dust proof push buttons.

All sequential interlocking shall be done with programmable logic controllers. The entire plant shall use the PLC system.

The basic function of the programmable controller is to provide output commands to the process equipment that are based on some combination input condition received from the machines. It is digitally operating electronic apparatus which uses a programmable memory for the internal storage of instruction for implementing specific function such as logic sequencing , time counting and automatic control through digital / analog input / output of various machines or process.

Both the loading points have separate such independent systems .

2. STANDARDS CODES& RULES

The equipment shall be designed in accordance with the provisions of the following standards, codes and rules :

IS :13947 LV switch gear and control gear

IS : 4064	Air Break Switches, air break disconnectors and fuse combination for voltages not exceeding 1000 V AC
IS : 8828	Miniature Circuit Breakers for voltages not exceeding 1000 V AC
IS :6875	Switches and push-buttons
IS :13703	LV fuses for voltages not exceeding 1000 V AC
IS :11353	Guide for uniform system of marking and identification of conductors and apparatus terminals
IS :2147	Degree of protection provided by enclosures for low voltage switchgear and Control gear
IS :3043	Code of practice for earthing
IS :6005	Code of practice of phosphating iron and steel.
IS :1248	Electrical Indicating instruments
IS : 2419	Panel mounted indicating and recording electrical instruments dimension
IS :1554	PVC insulated(Heavy Duty) cables for working voltages up to and including 1100V
IS : 694	PVC insulated cables for working voltages up to and including 1100V
IEC-65 A	Programmable controllers
IS :5	Colours for ready-mixed paints and enamels.
IE Rules 1956	

3. **DESIGN & CONSTRUCTION**

3.1 **Design**

The equipment shall be designed to ensure the following :

- (i) Continuous operation at rated capacity at service condition mentioned below :

Ambient air temperature	:	5 ⁰ C to 50 ⁰ C.
Altitude	:	Maximum upto1000 M above MSL.
Relative Humidity	:	Approximately 97 %.
Pollution degree	:	Degree 4 as per IS : 13947 (Part I) (i.e. the pollution generates persistent conductivity caused by conductive dust)

- (ii) Ready interchangeability of components of equipments with identical specification

- (iii) The bidder shall prepare electrical drawings for each module of the equipment for purchaser's approval.

3.2 Construction

3.2.1 The panel frame shall be fabricated using suitable mild steel sections of pressed and shaped, cold-rolled sheet steel of thickness not less than 2.0 mm. Frames shall be enclosed in cold-rolled sheet steel of thickness not less than 1.6 mm. Gland plates shall be of removable type and at least two separate gland plates shall be provided for each panel. They shall be of sheet steel of thickness not less than 3.0 mm.

The panels shall be assembled on channel / angle base frames.

The standing type panels shall be provided with hinged doors of width not exceeding 600 mm (with in built locked arrangement and handle). It shall be possible to open the door through 100 degree. The doors, cut-outs and covers shall be equipped with approved type of synthetic / rubber all round and sufficient number of latches / bolts shall be provided to achieve a degree of protection of IP 52 as per IS: 2147.

The height of all control devices on the panels shall be between 700 mm and 1600 mm from the finished floor level.

All equipment mounted on the front face of the panels shall be flush or semi-flush type.

Detailed internal arrangement drawing of the control panel indicating spacing between different components shall be submitted for Purchaser's approval.

For PLC controlled systems, the control panel shall have control desk type of configuration. The desk shall have doors at the back.

The control desk shall have one vertical bench surface and one horizontal bench surface at the front. On the vertical bench all meters, indicators, control CRT etc. shall be mounted. On inclined horizontal bench, key boards, electrical switches, push buttons, indicating lamps and selector switches shall be mounted. The annunciation windows shall be provided on the vertical plane of the control desk.

The PLC panel shall be free standing vertical type separate from control desk. The equipment shall be rack mounted and arranged in clearly defined sections for I/O devices, processors, power supplies etc. About 20% space shall be left for future expansion in each section. A cable marshalling section shall be included.

The PLC panels shall be provided with Perspex / glass doors in front to facilitate monitoring of the LED indication of various cards mounted in the card rack.

All components shall be clearly and unambiguously marked for proper identification and easy maintenance. Readily accessible and clearly marked test points shall be provided in all important modules and circuits.

I/O racks and processor cabinets shall be provided with door switches which shall provide proper annunciation on control desk in case doors are open.

Removable eye bolt or lifting lugs shall be provided on all panels to facilitate easy handling.

The Bidder shall ensure that the control panels are vermin proof, and all surplus holes in the gland plates shall be tightly closed by rubber plugs.

3.2.2 **Control and selector switches**

Control and selector switches shall be of rotary type with escutcheon plates clearly marked to show the function and positions.

Control / Selector switches shall be spring return or stay put type as per the requirements. Shape and type of handles shall be subject to approval of the Purchaser.

Ammeter and voltmeter selector switches shall have four stay-put positions with adequate number of contacts for three phase 4-wire system. Ammeter selector switches shall have make before break type contacts to prevent open circuiting of CT secondary.

Contacts of the switches shall be spring assisted.

The contact ratings shall be at least the following:

- i) Make and carry continuously - 6 Amp.
- ii) Breaking current at 220 V DC - 0.5A (Inductive)
- iii) Breaking current at 240 V AC - 5A at 0.3 p.f. lagging

3.2.3 **Push buttons**

Push buttons shall be spring return, push to actuate type and rated to make, continuously carry and break 6A at 240 V AC and 0.5 A (Inductive) at 220 V DC. The push buttons shall have at least 1 NO and 1 NC contacts. All contact faces shall be of silver or silver alloy.

Every push button shall be provided with integral escutcheon plate marked with its function.

The color of push buttons shall be as follows :

- GREEN - for motor START breaker CLOSE,
- RED - for motor TRIP, breaker OPEN,
- BLACK - for all annunciator functions, overload reset and miscellaneous

3.2.4 **Indicating lamps**

Indicating lamps shall be of the panel mounting, filament / LED type, low wattage and capable of clear status indication to operator under the normal room illumination. The lamps shall have escutcheon plates marked with their functions, wherever necessary.

Lamps shall have translucent covers of the following colors:

- RED - for motor ON, breaker OPEN / CLOSED
- GREEN - for motor OFF, breaker OPEN
- WHITE - for breaker TRIP
- BLUE - for all HEALTHY conditions (e.g. control supply, lube oil pressure)

AMBER - for all ALARM conditions

All indicating lamps shall be suitable for continuous operation at 90% to 110% of their respective nominal control supply voltage, i.e. 220 V DC or 240 V AC.

3.2.5 **Indicating instruments**

All indicating and integrating meters shall be flush mounted on panel front. The instruments shall be of miniaturized type with 90° scales and shall have an accuracy class of 2.0 or better.

Ammeters with selector switches shall be provided for all motors rated 22 KW and above. These shall have a compressed scale at the upper current region to cover the starting current. They shall be suitable to withstand, five times CT Secondary current for 30 seconds.

3.2.6 **Name plates and labels**

Each panel shall be provided with prominent, engraved identification plates for all front mounted equipment. Panel identification name plates shall be provided at front and rear.

All name plates shall be of non-rusting metal with white engraved lettering on black back ground. Inscription and lettering sizes shall be subject to Purchaser's approval.

For easy identification of all equipment inside the panel, they shall be marked with suitable, clear, indelible paint markings. Labels for fuses shall also clearly indicate current ratings of the respective fuses.

3.2.7 **Mimic display**

Mimic display of the mechanical / electrical system shall be provided on the VDU as per requirement.

3.2.8 **Air break switches**

Air break switches shall be of heavy duty, single throw, load break, complying with relevant code. The Bidder shall ensure that all switches are adequately rated so as to be fully matching with the associated fuses.

Power supply switch operating handles shall be provided with padlocking facilities to lock them in 'OFF' position.

All switch fuse units shall be provided with removable type neutral link.

3.2.9 **Fuses**

All fuses shall be of HRC cartridge fuse link type, and suitable rating.

All DC circuits shall be fused on both poles. AC circuits shall have fuses on phase side and link on neutral side.

All fuses shall have visible operation indicator.

3.2.10 Contactors

Auxiliary Contactor shall be of air break, electro-magnetic type and shall be of 6 A. 240 V AC, AC 11 utilization category. Contacts shall have a rated standard thermal current of at least 10 A. The contacts shall also have a 220 V, DC 11 utilization, category rating of at least 0.5 A. The contactor shall have a rated make/break life of at least one million operations.

Contactors shall have contacts as required for control schemes. Contacts shall be silver faced.

3.2.11 Relays and timers

All protective relays, auxiliary relays and timers shall be of proven design and of reputed make. Timers shall have the provision to adjust the delay on pick-up or reset as required.

Relays and timers shall have the necessary NO / NC contacts, as per scheme requirement.

3.2.12 Terminal blocks

Terminal blocks shall be of 650 Volts grade, rated for 10 Amps and in one piece moulding. They shall be complete with insulating barriers, clip-on-type and identification strips.

Terminal blocks for CT and VT secondary leads shall be provided with test link and isolating facilities. Terminals for CT secondary leads shall also be provided with short circuiting earthing facilities.

All terminal blocks on which external cables are connected shall be suitable for terminating at least 2 nos. of 1.5 mm² of stranded copper wire. Not more than two (2) wires shall be connected to any terminal.

All terminals shall be numbered for identification and grouped according to the function.

Terminal blocks shall have minimum clearances of 200 mm to cable gland plates, and of 150 mm to adjacent terminal rows, panel sides and other equipment.

Twenty (20) percent spare terminals shall be provided, distributed over all terminal blocks.

3.2.13 Wiring

All inter panel wiring and connections between adjacent panels including all bus wiring for AC and DC supplies, shall be provided by the Bidder.

All internal wiring shall be carried out with 650 V grade single core, 1.5 mm² or larger, stranded copper wires having color-coded, PVC insulation. Space heater circuits shall have wires having adequate current carrying capacity, but not less than 2.5 mm² Copper. Internal wiring between electronic cards shall be as per the standard practice of manufacturer.

Engraved core identification ferrules marked to correspond with panel wiring diagrams, shall be fitted at both ends of each wire. Jumper wires between two terminal blocks shall also be ferruled at both ends.

Spare contacts of relays, timers and switches shall be wired out to the panel terminal blocks only as

required by the Purchaser, during approval stage.

3.2.14 **Earthing**

A continuous copper earthing bus of 25mm x 3mm size shall be provided along the bottom of the panel structure. It shall run continuously through out the length of the panel and shall have provision at both ends for connection to the station earthing grid. Wherever termination of shielded cables is envisaged, provision for termination of cable shields shall be made.

Metallic parts of all components shall be effectively earthed using insulated copper wire or other approved means. Electrical continuity of the whole enclosure / frame work shall be maintained even after painting. All hinged doors shall be earthed through flexible earthing braids of copper.

Earthing of electronic circuits shall be looped between cabinets, I/O racks and shall be earthed at one point of PLC panel. The common earth point shall be connected to station earth mat on a separate riser.

3.2.15 **Space heater and lighting**

Space heaters shall be provided in the panels wherever the manufacturer considers necessary and recommends their provision for preventing harmful moisture condensation.

The space heaters shall be suitable for continuous operation on 240 V AC single phase supply and shall be automatically controlled by thermostat. Each free standing control panel section shall have a 240 V AC, plug point and a fluorescent light operated by door switch.

Necessary isolating switches and fuses shall also be provided.

3.2.16 **Control and power supply scheme**

One feeder of 415 V AC (two phases) shall be drawn by the Bidder from each bus section of MCC. The Bidder shall provide isolating switch fuse unit for receiving this supply. Two numbers of 415 / 110 V single phase dry type transformers shall be provided in control panel for A.C. control supply. These transformers shall be adequately sized to meet power requirements of auxiliary relays, indicating lamps & other auxiliary instruments. One pole of the secondary of these transformers shall be solidly earthed through link. A manual or automatic change-over arrangement (depending on requirement) shall be provided on secondary side of transformers.

The Bidder shall ensure proper discrimination in the fuses provided for different circuits, grouping of which shall be to Purchaser's approval.

For the PLC panel the power supply shall be tapped from the control panel. Necessary transformer / power packs shall be provided by the Bidder. The equipment power supply unit shall be mounted as an integral part of the enclosure and provide all voltages necessary to power the central processor and I/O cabinets. For separately mounted I/O racks separate power supplies shall be provided. Power supply module shall be of ample capacity to supply all modules. Additionally, about 20% spare capacity for future use shall be provided.

The components shall be suitable for the supply voltage variation of $\pm 10\%$ of the rated voltage and suitable for withstanding a momentary supply voltage rise upto 70% for about 10 secs. above the nominal system voltage. Necessary constant voltage transformers or voltage stabilisers shall be provided by the Bidder if required.

3.2.17 **Annunciation system**

The annunciation system shall be complete with suitable VDU having audio visual facility. Additionally Hardwired annunciation panels shall also be provided.

3.2.18 **PAINTING**

All sheet steel work shall be pre-treated in tanks in accordance with IS: 6005. Finishing paint on panels exterior shall be shade 692 (smoke gray) of relevant code. The inner surface of the panels shall be glossy white.

4. **Technical requirements of programmable logic controller :**

- 4.1 The PLCs shall be of modular construction and it shall be possible to change any module without disconnection of any wire.

The PLC system shall be capable of operating in automatic and/or manual control mode with commands from VDU control console and/or from a separate control desk.

4.2 **PLC processor**

The processor unit shall be capable of executing the following functions :

- a) Receiving binary and analog signals from the field and operator intimated command from the control panels.
- b) Implementing all logic functions for control & protection of the equipment and system
- c) Issuing control commands
- d) Providing alarm and status information.
- e) Performing self monitoring and diagnostic functions
- f) Providing log output

The controller shall provide all basic functions, operations, storage, counting, timing, logging and transfer operations and comparison functions. The programmable system shall be delivered completely programmed for the complete and reliable operation of the MCC.

In case of failure of working processor there shall be an appropriate alarm. In the event of both failing, the system shall revert to fail safe mode. It shall be possible to keep any of the processor as master and other as standby.

The memory shall be field expandable. The memory capacity shall be sufficient for the complete system operation with provision for at least 20% expansion in future. Programmed operating

sequences and criteria shall be stored in non volatile memories. All dynamic memories shall be provided with buffer battery back up which shall be for at least 360 Hours. The batteries shall be lithium or Ni-Cd type.

The PLC system shall be provided with necessary hard-ware for inter connection with Purchaser's / Other Contractor's data high-way, if required in future.

Facility shall be provided for changing the states of inputs and outputs, timers and flags to facilitate fault finding and other testing requirements. It shall be possible to display the signal flow during operation of the program.

A NORMAL/TEST/PROGRAMME/OFF lockable selector switch shall be provided on the control panel or processor.

Priority of different commands shall be as follows :

Manual intervention shall be possible at any stage of operation. Protection commands shall have priority over manual commands and manual commands shall prevail over auto commands.

INPUT / OUTPUT:

The PLC system should be designed according to the location of the input / output cabinets.

Individually output circuits with fuse blow indicator shall be provided. All input / output points shall be provided with status indicator. Input circuits shall be provided with fuses preferably for each input, alternatively, suitable combination of inputs shall be done and provided with fuses such that for any fault, fuse failure shall affect the particular drive system without affecting other systems.

All input / output cards shall have quick disconnect terminations allowing for card replacement without disconnection of external wiring.

The Bidder shall provide the following monitoring features :

- a) Power supply monitoring
- b) Contact bounce filtering
- c) Optical isolation between input and output signals with the internal circuits
- d) In case of power supply failure or hardware fault the critical outputs shall be automatically switched to the fail safe mode. The fail safe mode shall be decided during approval stage.

There shall be at least 20% spare capacity available on input, output and memory modules, over and above the system requirement.

Output module shall be capable of switching ON / OFF inductive loads like solenoid valves, auxiliary relays etc. without any extra hardware.

Only one changeover contact shall be provided in MCC for control and interlock requirement. Further, multiplication if required shall be done in PLC.

All input field interrogation voltage shall preferably be DC only.

In case of loss of remote I/O communication link with the main processing unit, the remote I/O shall be able to go to pre-determined fail safe mode with proper annunciation. This shall be decided in approval stage.

4.3 PRINTER & COLOUR MONITOR :

Printer shall be a part of the control system. It shall print out all alarm / trip conditions and event changes in plant status along with date and time of occurrence. Printer provided shall be laser type. The make of the same shall be subjected to Purchaser's approval.

IBM compatible LCD / LED color monitor with graphic facility shall be provided for control / monitoring and programming purposes. Configured keyboard with well defined levels and color coding shall be provided.

4.4 REMOTE I/O COMMUNICATION LINKS

The I/O communication system shall have two independent links that are continuously checked for failure. Any failure of communication links shall result in annunciation.

Bidder shall provide and install two runs of pre-fabricated plug in type shielded cables between I/O modules and PLC. In case of remote I/O's the communication link shall be operable when installed in underground conduits and may be subjected to submersion in water. The Bidder shall supply complete information for specification of the communication cables.

SPECIFICATION FOR MICRO-PROCESSOR BASED CONTROL SYSTEM AND UPS**1. OPERATION OF MICRO-PROCESSOR BASED PLANT MONITORING AND CONTROL SYSTEM**

1.1 The micro-processor based control system for sequencing operation shall be provided for monitoring and control of proposed Loading arrangement. The system shall comprise the following:

- i) Programmable logic controller based on micro-processor technology
- ii) Input / Output racks
- iii) Compatible system with colour monitor and standard key board
- iv) Modem for communication with remote PC
- v) Necessary pre-fabricated inter-connecting cables\

The system shall be micro-processor based system that can be used as a direct replacement for relay system and other hardware systems. The programming shall be in the form of Relay Ladder Diagram.

All the equipment will be controlled from a control desk located at control room .

The control system shall have the facility for :

- a) Local operation of equipment .
- b) Mimic display of equipment on Color VDU
- c) Fault Annunciation of equipment on VDU
- d) Sequence and interlocking operation

One number printer shall be provided at Control Room for providing hard copies of management information reports like hourly logs, shift logs, daily logs etc.

Individual Audio Visual units (AVU) should be installed in sub-station , switch room, hopper and all other strategic locations for the purpose of composite mimic display of the entire plant along with audio signaling

MICRO-PROCESSOR CONTROLLER

The system shall have micro-processor controllers for inter-acting with the starter panels of the drives with or without inter posing relays. These controllers shall also interact with various control instrumentation provided for monitoring of drives and shall basically consist of a regulated power supply unit and plug-in type cords for easy maintenance. The controller shall comprise a central processing unit, solid state memory, digital input modules with optical isolation with potential free contacts, digital output modules for generation of control output. The micro-processor memory shall contain software which shall achieve all logical processing by executing instructions in the CPU. The controller hardware shall be modular in construction so that future additions or alternations in the plant can be easily carried out at a nominal cost.

V.D.U

Single or dual VDU (TFT / LCD monitor, 26" Minimum) shall have to be provided with micro-processor controller for displaying mimics, alarms, plant status etc. A variety of mimics shall have to be provided so as to ensure enhanced and clear visibility of the plant. The mimics shall have separate colourcodes for healthy and faulty drives, local and remote drives etc. Besides mimics, the VDU shall be capable of showing various alarms and warning messages sequentially indicating the time of occurrence, name of faulty drive and the type of the fault. The alarms of critical nature shall have to be indicated to catch the immediate attention of the operator. The status of various plant drives shall have also to be shown on the VDU as described earlier.

FUNCTIONAL KEY BOARD

Necessary functional keyboard shall have to be provided as an operator inter-face with the plant. The operator shall be able to key in various plant commands, provide individual start / stop, sequential start / stop, block start / stop, acknowledge alarms etc. The operator shall also be able to call up various display of the VDU as desired by him.

PRINTER

A printer shall have to be there to provide a hard-copy of various displays and logging reports for management reporting. Various logs e.g. hourly logs, shift logs and demand logs shall have to be provided.

SOFTWARE

The micro-processor plant monitoring and control system shall have to be based on easily reconfigurable software. Various sequencing inter-locks and timing functions shall have to be provided with the help of the software. The software shall be flexible and easily expandable in case of future additions / alterations in the plant. It shall be operator friendly and easy to understand.

LOCAL CONTROL STATION

The inter-locking and selector switch, start stop push buttons and indication lamps on the local control station shall be mounted on the front face of the enclosure. The local control stations shall be pedestal / wall mounted.

SELECTOR SWITCH

All the selector switches shall be dust proof and oil tight, rotary switches with pistol handle operating facility. The rating of contact shall be minimum 10 amps at 230 Volts. The switches shall conform to IS: 2628 (latest).

START – STOP PUSH BUTTONS

Push buttons shall be dust and oil tight and the face of the button shall be flushed with the retaining ring. 'Start' buttons should be green and stop buttons should be red in color.

INDICATING LAMP:

The indicating lamps shall be preferably miniature, filament / LED type with caps of colored translucent lenses. The lamp on the local control station shall be so fitted that it is removable from the front of the unit without disturbing the internal wiring and the holder. The indicating lamps shall conform to IS: 1901(Latest).

EMERGENCY STOP PUSH BUTTON

All hand operated emergency stop push buttons shall have mushroom type head, Red in color with manual resetting facility. Emergency stop switches shall be dust and oil tight with necessary NO and NC contacts rated for 10 Amps. at 230 Volts A.C.

LEGEND PLATE

The legend plates shall be provided to identify the rating and function or operation of all control components / indications. All the legend plates shall be of black anodized aluminium with text engraved thereon.

CONTINUOUS LEVEL MONITOR

The continuous level monitor shall be dust and water tight and suitable for continuous monitoring of level of coal in the hopper. The system shall be either ultrasonic type or can be based on advanced micro-wave circuitry and micro processor technology. The system shall ensure high reliability and have local and remote display facilities indicating average level and quantity of coal in the hopper at any instant.

1.2 INSTRUMENTATION/SIGNAL / COMMUNICATION CABLE

Instrumentation and signaling cables and fiber optic cables required for instrumentation and signaling, interfacing and communication between different PLCs and field mounted equipment shall be provided.

2. UPS SYSTEM AND BACK-UP ARRANGEMENT :

UPS system of sufficient capacity with redundancy shall have to be provided, with suitable batteries for 30 minutes back-up arrangement. The UPS system shall be 'ON-LINE' system which shall ensure that there is no break in the power supply to the PLC based control system.

In the event of loss of power supply it will be able to maintain the status record of various equipment of plant control system on un-interruptible power supply having capacity to feed the load of PLC system for duration of ½ hour during which the power supply is restored.

1. SPECIFICATION FOR LOCAL CONTROL STATION

The Local Control Stations (LCS) shall be metal enclosed, suitable for outdoor / indoor mounting on wall or steel structures. The enclosure shall be die-cast aluminium or cold rolled sheet steel of at least 1.6 mm thickness. The enclosure shall be provided with a hinged guard at the front, covering full length, to avoid inadvertent operation of pull chord switches / push buttons. LCS shall be painted to shade no. 692 of IS: 5 in accordance with relevant code. The LCS shall be dust and vermin proof and shall have a degree of protection of IP-53 as per relevant code.

The LCS shall be suitable for both top and bottom cable entry (either of which may be used depending on cabling convenience) and shall be provided with removable undrilled gland plates or knockouts. Adequate space shall be available inside the LCS enclosure for terminating external cables directly on pull cord / push button terminals. Overall size of LCS shall be subject to Purchaser's approval.

The Local Control Stations shall have the following functions :

- i) EMERGENCY STOP push button with one NO and one NC contact.
- ii) Self reset "Trial Run" and a self reset "Trial Stop" push button each with one NO and one NC contact.
- iii) "LOCAL" & "REMOTE" selector switch.
- i) Required Indication Lamps

2. SPECIFICATION FOR LOCAL MOTOR STARTER

The Local Motor Starters shall be provided for manual switching of 415 V, 3 phase squirrel cage motors.

The starters shall be metal enclosed, suitable for outdoor / indoor mounting on wall or steel structures. The enclosure shall be die-cast aluminium or cold rolled sheet steel of at least 1.6 mm thickness. The enclosure shall be provided with a hinged guard at the front, covering full length, to avoid inadvertent operation of push buttons. The starters shall be painted to shade no. 692 of IS:5 in accordance with relevant code and shall be dust and vermin proof and shall have a degree of protection of IP-52 as per relevant code.

The Starters shall be suitable for both top and bottom cable entry (either of which may be used depending on cabling convenience) and shall be provided with removable undrilled gland plates or knockouts. Adequate space shall be available inside the starter enclosure for terminating external cables directly on push button terminals. Overall size of Starters shall be subject to Purchaser's approval.

Each Starter shall comprise of : :

- i) A 3-pole contactor, mechanically latched type
- ii) Start Push Button, colored GREEN
- iii) Stop Push Button, colored RED
- iv) Ambient temperature compensated thermal overload relay with single phasing protection.
The continuously variable relay setting range shall be suitable for the motor rating.

The start push button when pressed shall preferably remain in depressed position and shall be released along the contactor when the stop push button is pressed or when thermal overload relay operates. Local starters shall be suitable for loop-in and loop-out of incoming cable and for one outgoing cable to a motor.

SPECIFICATION FOR INDUCTION MOTORS

1. SCOPE

This specification covers the requirements for three phase foot / flange mounted continuous rating and duty type induction motors.

The motors shall comply with the latest version of IS 325 & IEC 34-1 except where modified or extended by this specification and with the relevant parts of standards mentioned in para 2.0

2. OTHER RELEVANT STANDARDS

The other relevant standards applicable are as under :

IS: 900	Code of practice for installation and maintenance of induction motors
IS: 8223	Dimensions and output ratings for foot mounted electrical machines with frame number 355 to 1080
IS: 1231	Dimension of three phase foot mounted induction motors
IS: 2223	Dimension of flange mounted induction motors
IS: 210	Frames for rotating electrical machines
IS: 1271	Classification of insulating materials for electrical machinery and apparatus in relation to their thermal stability in service
IS: 2253	Designation for type of construction and mounting arrangement for electrical machines
IS: 3043	Code of practice for earthing
IS: 4029	Guide for testing three phase induction motors
IS: 4691	Degree of protection provided by enclosures for electrical machinery
IS: 4722	Rotating electrical machinery
IS: 6362	Designation of methods of cooling for rotating electrical machinery
IS: 7816	Guide for testing insulation resistance of rotating machinery
IS: 12065	Permissible limits of noise level for rotating electrical machines
IS: 12075	Mechanical vibrations of rotating electrical machines
IS: 2147	Degree of protection provided by industrial enclosures
IS: 4729	Measurement and evaluation of vibration of rotating electrical machines
IS: 4889	Method of determination of efficiency of rotating electrical machines
IS: 8789	Values of performance characteristic for three phase induction motors
IS: 12824	Type of duty and classes of rating for rotating electrical machines
IS: 12802	Temperature rise measurement of rotating electrical machines
IS: 3003	Carbon Brushes for electrical machines

3. DESIGN

3.1 Electrical

- a) The motors shall be of continuous duty (S1) and rating type in accordance with relevant code.
- b) The temperature measured over the surface of the motor shall not exceed 70°C over the ambient air for the class of insulation B and 80°C for class F in accordance with relevant code.
- c) The motor shall be designed to deliver rated output with the terminal voltage differing from its rated value by not more than $\pm 10\%$, frequency differing from its rated value by not more than $\pm 3\%$ and any combination of these limited to 10%.
- d) The motors shall be capable of withstanding the forces associated with the maximum in rush current, the locked rotor torque and the pull out torque at the highest system voltage and at the upper limit of supply frequency during starting.
- e) The motors shall be capable of starting and accelerating to the rated speed along-with the fully loaded driven equipment without exceeding the acceptable winding temperature even when the supply voltage is 80% of rated voltage.
- f) The motors shall be suitable for two cold starts in succession under the normal loading condition.
- g) The motors shall withstand for 15 seconds without stalling or abrupt change in speed under gradual increase of torque up to 1.6 times its rated value, the voltage and frequency being maintained at their rated value.
- h) The accelerating torque at any speed with the lowest starting voltages shall be at least 10% of rated full load torque.

3.2 Mechanical

- a) The method of cooling for motors shall depend upon the system requirement.
- b) The enclosures for motor shall have IP44 protection for indoor application and IP55 protection for outdoor applications in accordance with IS: 4961.
- c) The motor vibration shall confirm to the requirements in accordance with relevant code.
- d) The motor noise level shall confirm to the requirements in accordance with relevant code.

4. CONSTRUCTIONAL DETAILS

4.1 General

- a) The motor and its components such as stator, rotor end shield, terminal boxes and the bearings shall be designed to be readily inter-changeable as integral units for the same design and rating.
- b) All non-metallic components used shall be resistant to flame propagation.
- c) All heavy parts of the motors shall be provided with necessary lifting arrangements .

4.2 Stator frames and shields

- a) The stator frames and end shields shall be rugged and made of cast iron conforming to relevant code.
- b) The frame holding the stator core and windings must be strong and rigid to withstand short circuit force and unbalanced magnetic pull and minimise vibrations.

4.3 **Cooling arrangements**

- a) LT Squirrel cage motors shall be Totally Enclosed, Fan Cooled, (TEFC) by a light weight cast Aluminium fan of bi-directional design and very low inertia. The fan shall be keyed to the shaft. Slip-ring type motors, if provided shall be with CACA cooling.

4.4 **Enclosures**

The enclosure shall be totally enclosed fan cooled with suitable means for breathing and drainage. The drain hole diameter shall not exceed 6 mm.

4.4 **Stator**

- a) The stator core shall be built up of low loss high permeability steel laminations.
- b) The winding shall be two layer type consisting of synthetic enameled copper conductors in Semi closed slots.
- c) Insulation shall be class-B for 415V motors.
- d) All winding overhangs and leads shall be adequately supported braced and blocked.

4.6 **Rotor**

- a) The rotor core shall be of similar construction to that of the stator
- b) The cage bars for cage motors shall be of copper.
- c) The complete rotor shall be dynamically balanced with the fan on the shaft for TEFC motors ensuring vibration free smooth running.

4.7 **Shaft**

- a) The shaft shall be manufactured from high grade steel, preferably C-40. The sustained deflection of the shaft shall be well below 10% of the air gap.

4.8 **Bearings**

- a) The bearings shall be ball /roller type for 415 V motors .
- b) The bearings shall be self lubricated.
- c) The bearings shall be in accordance with the relevant codes.
- d) 415 V motors shall be grease lubricated.

4.9 **Terminal box**

- a) Terminal boxes integral with the stator frame shall be provided with terminals for stator leads.
- b) Terminals shall be suitable for receiving single layer armoured Aluminium conductor PVC / XLPE insulated cables.
- c) Terminal boxes shall be suitable for top entry of cables.

4.10 Earthing terminals

Two independent earthing terminals shall be provided in accordance with I.E Rules on diagonally opposite corners of the motor for bolted connection.

4.11 Mounting

The motors for pumps, compressors, fans, and blowers shall have the mounting B3 or as specified elsewhere in this tender.

4.12 Auxiliary devices

The motor shall be suitable for the auxiliary devices mentioned below:

Type of load	Auxiliary devices on the shaft
Compressor and fans	Pulleys
Conveyors, feeders and Screens if any	Gears / Fluid coupling
Space Heaters	Space Heaters suitable for 230 V, 50 Hz, single phase supply system shall be provided for motors above 30 kW capacity. For motors below 30 kW, space heaters shall be provided if it is meant for specific use in damp areas.

5. Performance

The values of minimum full load speed, maximum full load current, minimum pull out torque and minimum locked motor torque as percentage of the full load torque at rated voltage and frequency for duty type S1 shall be in accordance with relevant code.

6. Rating Plate

A rating plate stating the following information shall be supplied with each motor :

- a) Reference standard
- b) Name of manufacturer
- c) Manufacturer's number and frame reference
- d) Type of duty
- e) Class of insulation
- f) Frequency in Hz
- g) Number of phases
- h) Rated output in kW
- i) Rated voltage and winding connections
- j) Current, approximate in amperes at rated output
- k) Speeds in revolutions per minute, at rated output
- l) Rotor (Secondary) voltage and winding connections

- m) Rotor (Secondary) current in amperes at rated output
 - n) Ambient temperature
 - o) Enclosure Type
7. All motors shall be provided with eye bolts, lugs or other means to facilitate lifting.
8. The design, manufacture, installation and performance testing shall conform to the latest revisions of the Indian Standards or their equivalent IEC standards for the applicable motor type and rating, and to the latest Indian Electricity Acts, Indian Electricity Rules and IS: 325.

TECHNICAL PARAMETERS

1	Reference standard	IS : 325
2	Service conditions	
a)	Ambient Air Temperature	Maximum 50 ⁰ C
a)	Altitude	Maximum upto 1000M above MSL
b)	Location	Heavily polluted with coal dust medium
3	Rated voltage (with percent variation)	415 V \pm 10%
4	Frequency(with percent variation)	50 Hz \pm 3%
5	Class of duty	Continuous (S1)
6	Type of rating	Continuous
7	Class of insulation	Class B for 415 V motors
8	Temperature rise allowed over the ambient air	70 ⁰ C over ambient for class B
9	Type of enclosure of motor	TEFC
10	Degree of protection for enclosure of motor	IP 44 for indoor & IP 55 for outdoor motors and motors for conveyors
11	Degree of protection for terminal box	IP 54
12	Method of cooling	TEFC
13	Lubrication of bearings	Lithium grease for roller and thrust bearings, oil for pedestal bearings
14	Mounting	Horizontal foot (B3)/Flange or Face (B5)/As per requirement
15	Type of rotor	Squirrel cage / Slip ring
16	No. of poles	4/6/8/10
17	Maximum value of slip	5 Percent

18	No. of phases	Three
19	Minimum efficiency at full load	90% for motors above 18.5 kW
20	Maximum value of locked rotor current as percentage of full load current	650%, subject to tolerance as given in IS:325
21	Minimum value of locked rotor torque as percentage of full load torque	185% for motors above 18.5 kW
22	Minimum value of pull out torque as percentage of full load torque	200% for motors above 18.5 kW
23	Clearance between phases at terminal box	10 mm for 415 V motors
24	Clearance between phases to earth at terminal box	10 mm for 415 V motors
25	Fault withstand level for terminal box	31 MVA for 415V motors
26	Particular of test requirements	
a)	Certificate for Type tests issued by a test house of repute conducted on one motor of a lot having identical specification.	Required
b)	Certificate for Routine tests issued by a test house of repute conducted on each motor having identical specification. The certificate shall bear the serial number of the motor identical to that appearing on the rating plate .	Required

ANNEXURE : ES-6

SPECIFICATION FOR 100 kVA, 415 V / 230 V (L-L) LIGHTING TRANSFORMER

1. SCOPE

This specification covers the requirements for two winding indoor type lighting transformer fitted with tap changer.

The transformer shall comply with the latest revisions of IS: 2026 and IEC: 76 except where modified or extended by the provisions of this specification and with the relevant parts of standards mentioned below .

2. OTHER RELEVANT STANDARDS

The other relevant standards that are applicable are as under :

- IS : 10561 : Application guide for power transformers.
- IS : 10028 : Code of practice for selection, installation and maintenance of transformers.
- IS : 1866 : Code of practice for maintenance and supervision of mineral insulating oil.
- IS : 2099 : Bushing for alternating voltages above 1000 V.
- IS : 3639 : Fittings and accessories for power transformers.
- IS : 335 : New insulating oil for transformers.
- IS : 6600 : Guide for loading of oil immersed transformers.
- IS : 2165 : Insulation Co-ordination.
- IS : 2071 : Method of Impulse voltage testing.
- IS : 3043 : Code of practice for earthing.
- IS : 1271 : Thermal evaluation and classification of electrical insulation.
- IS : 1554 : PVC insulated (heavy duty) electric cables - 1100V. (Part -I)
- IS : 7404 : Paper covered copper conductors
- IS : 5 : Color for ready mix paints.

3. DESIGN FEATURES

The design of the transformer and accessories shall be in accordance with the latest standard practice and shall be such as to facilitate inspection, cleaning, repairs, maintenance and operation and shall ensure safety operations under situation of sudden variations of loads and voltages as may be required under local operating conditions.

Electrical Features

The electrical features shall ensure the following :

- a) Continuous operation at rated kVA within ± 10 percent variation (combined) of voltage and frequency.
- b) Continuous operation at rated kVA at each of the tap voltages

- c) Over loading of units as indicated in IS : 6600
- d) Temperature rise limited to the following values :

Cooling	Oil	Winding
ONAN	45°C	55°C

Mechanical Features

- a) The transformer shall be able to withstand the electro-dynamic stress due to terminal short circuit of the secondary side assuming the primary side fed from an infinite bus. All leads, windings in cores shall be properly supported, clamped and tightened after vacuum drying to ensure the short circuit withstand ratings. The short circuit withstand duration shall be minimum 2 sec.
- b) The transformer shall be so designed as to minimise any undue noise and vibration.

4. CONSTRUCTIONAL DETAILS

Core

- a) The transformer core shall be made as per relevant IS. Lifting eyes and lugs shall be provided on the limbs and coils assembly.
- b) Cores and windings shall be capable of withstanding shocks during transport, installation & service and adequate provision shall be made to prevent movement of core and winding relative to tank during these conditions.

Tanks

- a) Tanks shall be of welded construction and fabricated as per relevant IS.
- b) Tanks stiffeners shall be provided for general rigidity and these shall be designed to prevent retention of water.
- c) The tanks shall be designed to withstand :
 - i) Mechanical shocks during transportation
 - ii) Vacuum filling of oil
 - iii) Short circuit force
- d) Adequate space shall be provided at the bottom of the tank for settlements of sediments.
- e) Suitable guides shall be provided in the tank for positioning the core and coil assembly.
- f) The tank shall be suitable for movement in both directions during shipment. Each tank shall be provided with
 - i) Lifting lugs suitable for lifting the complete transformer
 - ii) A minimum of four jacking pads to be raised or lowered using hydraulic or screw jacks.

Tank Cover

- a) The tank cover shall be sloped to prevent retention of rain water.
- b) At least two adequately sized inspection covers one at each end of the tank shall be provided for easy access to bushings and earth connection. The inspection covers shall have suitable lifting arrangement.
- c) Bushings, inspection covers etc. shall be designed to prevent ingress of water into or leakage of oil from the tank.
- d) All bolted connections shall be fitted with weather proof hot oil resistant neoprene gasket in between for complete oil tightness. If gasket is compressible metallic stop shall be provided to prevent over compression.

Mounting Arrangement

- a) The transformer shall be provided with two nos. bi-directional skids and pulling eyes integral with the tank body for fixing the transformer tank on foundation.
- b) These skids shall be such that the bottom of the tank is at a sufficient height above foundation for cleaning purposes. The transformer shall be provided with uni-directional / bi-directional flat rollers.

Conservator Tank

- a) The conservator tank shall have adequate capacity to accommodate oil preservation system and volumetric expansion of the total cold oil volume in the transformer and radiators for a change in temperature from minimum ambient air temperature of 5⁰C to 110⁰C.
- b) The conservator shall be bolted into position so that it can be removed for cleaning purposes.
- c) The conservator tank, shall be fitted with a silica gel filter breather.
- d) The conservator shall be fitted with plain oil level gauge. The oil level at 30⁰C shall be marked on the gauge.

Explosion Vent

- i) The transformer shall be provided with the single type of explosion vent.
- ii) An equaliser pipe shall be connected to explosion vent from the conservator.

Windings

- a) The conductors shall be of electrolytic grade copper.
- b) All windings shall be fully insulated.
- c) The insulation of transformer windings and connections shall be as per relevant IS.
- d) All bus bars and leads shall be adequately supported in insulated cleats or frames from the clamping structure.
- e) The studs, set screws or bolts provided for securing cleats or frames shall be effectively locked.
- f) The impedance values shall be 4 % \pm 10 %.
- g) The winding shall be connected to achieve a vector group of DY11.

Insulation Materials

- a) Class 'A' insulating materials specified in IS : 1271 or latest version shall be used.
- b) Insulating Oil
 - i) The insulating oil supplied with the transformer shall conform to the requirements of IS : 335 tested at bidder's premises.
 - ii) Prior to filling the oil in the main tank suitable number of samples shall be tested for BDV, moisture content, resistivity at 90⁰C, tan delta at 90⁰C and interfacial tension. The oil samples taken from the transformer at site shall conform to the requirements of IS : 1866.
 - iii) The manufacturer shall dispatch the transformer filled with oil.
Ten percent (10%) extra oil shall be supplied for topping up, in non returnable sealed containers suitable for outdoor storage.

Earthing Terminals

Two earthing terminals suitable for connecting 65 x 8 mm mild steel flat shall be provided at positions close to the two diagonally opposite bottom corners of tank. These grounding terminals shall be suitable for bolted connection.

OIL Preservation System

The transformer shall be provided with the conventional conservator preservation system with a single compartment with dry air filling of space above the oil. The top of the conservator shall be connected to the atmosphere through a silica gel filter breather. It shall be so designed that :

- i) Passage of air is through dust filter and silica gel
- ii) Moisture absorption indicated by a change in color of the tinted crystal can easily observed from a distance

TERMINAL ARRANGEMENT

- a) **Porcelain Bushing**
 - i) The minimum clearances in air between the phases and between the phase and earth potential of the porcelain bushings shall be in accordance with IS : 2026 - part V, 1994.
 - ii) Bushing terminals shall be provided with suitable terminal connectors of approved type and size for ACSR/AAAC/Cable as specified in the annexure.
 - iii) All transformer bushings shall be of solid porcelain with plain sheds conforming to IS:8603.
 - iv) The removal of bushing shall be possible without disturbing the current transformers, secondary terminals and connectors or pipe work.
- b) **Cable Boxes and Disconnecting Chambers**
 - i) Wherever cable connections are specified, suitable air insulated type cable boxes of required sizes shall be provided to accommodate cable termination. Cable boxes shall be designed and installed such

that it shall be possible to move away the transformer without disturbing the cable termination leaving the cable box on external supports. The support for the cable box shall be of galvanised iron.

- ii) Cable boxes shall have terminal connectors of adequate size and bolt holes to receive cable lugs.
- iii) The bidder shall provide earthing terminals on the cable box to suit 65 x 8 mm GI flat.
- iv) All necessary cable terminating accessories such as supporting brackets, power cable lugs, hard ware etc. shall be provided by the bidder.
- v) Cable boxes shall have removable top cover and ample clearance shall be provided to enable either transformer or each cable to be subjected separately to high voltage test.
- vi) Cable boxes shall have degree of protection of IP-52 as per IS : 2147.

TERMINAL MARKING

The terminal marking and their physical position shall be in accordance with IS: 2026

TERMINATION ARRANGEMENT FOR NEUTRALS

- a) The transformer shall be solidly earthed at the secondary neutral.
- b) The neutral terminal brought on to a separate neutral bushing shall be connected to associated neutral grounding pit by a copper flat, which shall be supplied and installed by the bidder.

OFF CIRCUIT TAP CHANGE SWITCH

- a) The tap change switch shall be three phase, hand operated, for simultaneous switching of similar taps on the three phases by operating external handle.
- b) Arrangement shall be made for securing and pad locking the tap changer in each of the working positions, and it shall not be possible for setting or padlocking in any intermediate position. An indicating device shall be provided to show tap in use.
- c) The cranking device for manual operation shall be removable and suitable for operation by a man standing on ground level. The mechanism shall be complete with the following :
 - i) Mechanical operation indicator.
 - ii) Mechanical tap position indicator which shall be clearly visible from the transformer.
 - iii) Mechanical stops to prevent over cranking of the mechanism beyond extreme tap position.
 - iv) The manual operating mechanism shall be labeled to show the direction of operation for raising the secondary voltage and vice versa.
 - v) A warning plate indicating "The switch shall be operated only when the transformer has been de-energised" shall be fitted.

Cooling tubes

The cooling tubes shall be mounted on the tank as per relevant IS.

PAINTING

The internal and external surfaces including oil filled chambers and structural work shall be painted

with oil and weather resistant non fading paint of light grey color corresponding to shade no. 631 of IS : 5. Primary paint shall be as per IS : 104 and intermediate and final coats of paint shall be as per IS : 2932.

FITTINGS

The following fittings shall be provided with all the transformers :

- a) Rating and diagram plate.
- b) Terminal marking plate
- c) Two earthing terminals
- d) Lifting lugs
- e) Jacking lugs
- f) Drain valve with plug.
- g) Dehydrating breather
- h) Plain oil level indicator with minimum marking.
- i) Off load tap changing switch
- j) Oil filling hole with cover
- k) Conservator
- l) Explosion vent
- m) Skids and pulling eyes on both sides
- n) Rollers, Flat unidirectional limited to 1000 mm
- o) H.V. porcelain bushings with metal parts or H.V. cable box.
- p) Filter valve.
- q) Inspection cover
- r) L.V. cable box.

5. PERFORMANCE

a) Operating Conditions

- i) The transformers shall be capable of being loaded in accordance with IS:6600 up-to load of 150%. There shall be no limitation imposed by bushings, tap changer etc.
- ii) The transformers shall be capable of being operated continuously without danger on any tapping at the rated KVA with voltage variation of $\pm 10\%$ corresponding to the voltage of the tapping.

b) Fault Conditions

- i) The transformer and all accessories shall be capable for withstanding any external short circuit at bushing terminal without damage for two (2) seconds.
- ii) Manufacturer shall also indicate 150 % over voltage withstand time.

c) **Impedance**

The impedance on principal tapping shall be guaranteed to be as indicated in the table below .

TECHNICAL PARAMETERS OF TRANSFORMERS

100 kVA, 415 V / 230 V (L-L)

1	Rated Capacity	100 kVA
2	Location	Indoor
3	Type of transformer	Core type oil immersed
4	Frequency	50 Hz \pm 3%
5	Type of cooling	ONAN
6	Type of oil	Mineral oil
7	Rated Voltage	
	HV Winding	415 Volts \pm 10%
	LV Winding	230 Volts (L-L) \pm 10%
8	Highest system voltage	
	HV Winding	650 Volts
	LV Winding	250 Volts
9	Impedance voltage at rated current	4% \pm 10%
10	Method of system earthing	
	HV Winding	Nil
	LV Winding	Solid
11	Connection symbol	DY11
12	Earthing of neutral terminals	Required for LV winding
13	Tap changer type	Off circuit
14	Tapping percentages	\pm 2.5, \pm 5 , \pm 7.5%, (7 steps)
15	Terminal Arrangement	
	a) HV side	Cable box
	b) LV side	Cable box

16	a) Temperature rise (over Ambient) in Oil	45 ⁰ C
	b) Temperature rise (over Ambient) in Winding	55 ⁰ C
17	Type of Winding	Double wound Copper
18	Standard applicable for transformer	IS : 2026 (Current)
19	Standard applicable for oil used	IS : 335 (Current)

A. SPECIFICATION FOR MAIN LIGHTING DISTRIBUTION BOARDs (M.L.D.B.)

SCOPE

This specification covers requirements for 230V(L-L) MLDBs, metal enclosed, dust and vermin proof to be installed in substation, conforming to the latest revision of IS:8623-1993 except where modified or extended by the provision of this specification.

OTHER RELEVANT STANDARDS

The other relevant Indian standards are as under :

- IS : 3043 : Code of practices for earthing.
- IS : 4237 : General requirements for switchgear and control gears for voltages not exceeding 1000V AC.
- IS : 12021 : Specification of Control transformers for switchgear and control gears for voltages not exceeding 1000 V AC
- IS : 722: A.C electricity meters.
- IS : 1248 : Direct acting indicating analogue elect measuring instruments
- IS : 2551 : Danger Notice Plates
- IS : 5082 : Wrought Aluminium Alloys for electrical purpose
- IS : 6005 : Code of practice of phosphating iron and steel
- IS : 3202 : Code of practice for climate proofing of electrical equipment
- IS : 2147 : Degree of protection provided by industrial enclosures
- IS : 5 : Colours for ready mixed paints and enamels.

DESIGN CRITERIA

The boards shall operate on a 230V (L-L) ($\pm 10\%$), 3 phase, 3 wire, 50 Hz ($\pm 3\%$) power supply. Fault withstand capacity shall not be less than 10 kA for one second.

The boards shall have power frequency withstand voltage of 3000V. All similar components shall be interchangeable and shall be of same type and rating for maintenance and low spare inventory.

CONSTRUCTIONAL FEATURES

The boards shall be made of two modular standard vertical sections, extendible on either side. Each vertical section shall be made of sheet steel enclosures on steel frames. The thickness of steel sheets shall be 2 mm for load bearing sections and 1.6 mm for non-load bearing sections.

The vertical sections shall be single front type and of two tier formation.

Degree of protection of the enclosure shall be IP 43 with coats of paints conforming to IS: 5.

The bus bars shall be TP, Aluminium and of adequate current rating for horizontal and vertical bus.

The bus bars shall be mounted on non hygroscopic, anti tracking, flame retardant, self extinguishing insulators. The bus bars shall be PVC insulated (sleeved).

The cable termination for cable sizes within 70 mm² shall be inside each vertical section. For sizes above 70 mm², the termination shall be in a cable chamber extended type. All the cable entries shall be from bottom.

The earth bus bar shall be of minimum 90 mm² Aluminium.

The board shall have a mechanical safety door interlock device to prevent opening of the door if the switches are ON. Similarly, it shall be ensured that the switch cannot be switched ON unless the door is closed. There shall also be padlocking arrangement for the door to prevent unauthorized access.

The MCCBs, Horizontal bus bars, extended chambers and the MCBs shall be in separate compartments.

ON/OFF switches of the MCCBs and MCBs and knobs of Ammeters shall be protruded for operation without opening the doors.

The incoming feeders shall be provided with Ammeters with selector switches.

The boards shall have a display of Danger Notice and supply shall be made with front rubber mat.

TECHNICAL SPECIFICATION FOR 230 V(L-L) MLDB

1	Installation	Indoor
2	Enclosure	Single front, IP 43
3	Rated voltage	230 V(L-L)
4	Bus bar	TP (Aluminium)
5	Horizontal bus bar rating	Adequate Rating
6	Vertical bus bar rating	Adequate Rating
7	Short time rating	13.1 kA rms for 1 second
8	Withstand voltage	3000 V, 50 Hz, 1 min.
9	Cable termination	Cable chamber
10	Cable types	Three core PVC SWA (Al.) conductor
11	Cable entry	Bottom
12	Size of earth bus	90 mm ² Aluminium (minimum)
13	Metering Arrangement	Ammeters with selector switch on incomers.
14	Safety interlock	As mentioned above
15	Finish	Two coats of primer and one coat of final paint as per IS : 5.

B. SPECIFICATION FOR MOULDED CASE CIRCUIT BREAKERS

SCOPE

This specification covers requirements for 230 V (L-L) Moulded Case Circuit Breakers suitable for installation in switchboards (MLDB).

The Moulded case circuit breakers shall comply with the latest revision of IS: 13947(Part I) and IEC: Publication 947 except where modified or extended by the provision of this specification and with the relevant parts of standards mentioned below .

OTHER RELEVANT STANDARDS

The other relevant Indianstandardsare as under :

- IS : 3072 : Code of practice for installation and maintenance of switchgear.
- IS : 4237 : General requirements for switchgear and controlgears for voltages not exceeding 1000V AC.
- IS : 10118 : Code of practice for selection, installation and maintenance of Switchgear and Control gear.
- IS : 11353 : Guide for uniform system of marking and identification of conductors and apparatus terminals.

DESIGN CRITERIA

The Moulded Case Circuit Breakers shall operate on a 230V (L-L) ($\pm 10\%$), 3 phase, 50 Hz ($\pm 3\%$) power supply. Fault withstand capacity shall not be less than 10 kA.

All similar components shall be interchangeable and shall be of same type and rating for easy maintenance and low spare inventory.

The rated carrying capacity shall be sufficient at the rated voltage and frequency and the circuit breaker shall carry this current continuously while complying with this specification.

CONSTRUCTIONAL FEATURES

- 1) The Circuit breakers shall be three pole, moulded case air break type.
- 2) The circuit breaker shall have tripping mechanism for over load and short circuit irrespective of the type of operating mechanism. In addition, provision shall be made for manual tripping of the breaker. The breakers shall be fixed type.
- 3) Circuit Breaker shall be provided with anti-pumping and trip free feature.
- 4) Tripping shall be possible by means of front mounted "OFF" switch. Making of the breaker shall be possible by means of "ON" switch.
- 5) Suitable indications shall be provided on circuit breaker to show "ON", "OFF", conditions.

- 6) The following protection (release type) shall be provided :
- a) Ambient temperature compensated thermal overloadtrip with adjustable settings.
 - b) Magnetic Short circuit trip.

PERFORMANCE

- 1) The temperature rise of parts of the equipment like terminals, accessible parts, main circuit, windings of coils and electromagnets etc. measured during the test carried out in accordance with IS: 13947 (Part I) shall not exceed temperature rise limits specified in the said standard.
- 2) The dielectric property of the equipment, clearances and minimum creepage distance shall conform to IS: 13947 (Part I).
- 3) The equipment shall be capable of making and breaking load and overload currents without failure under the conditions stated in the relevant product standard for the required utilisation category.
- 4) The equipment shall be capable of withstanding thermal and electromagnetic stress from short circuit currents during current making, current carrying in the closed position and during current interruptions.

NAME PLATE

The name plates of the circuit breaker shall have suitable marking as under :

Manufacturer

Type designation and serial number

Rated voltage

Rated current

Rated frequency

Short circuit withstand capacity

Short circuit breaking capacity

Weight

Year of manufacture

TECHNICAL SPECIFICATION

1	Installation	Switch board
2	Number of Poles	3
3	Service Voltage	230V (L-L) (± 10%)
4	Rated current (A)	As Required
5	Making capacity	25 kA (peak)
6	Frequency	50 Hz (± 3%)
7	Sym. breaking capacity	10 kA (rms)
8	Short time current for 1 Sec.	10 kA (rms)

9	Settings	Thermal (Adjustable), Magnetic 9 kA
10	Operating Mechanism	Manual Trip free
11	Tripping arrangement	Thermal overload and Short circuit electromagnetic release.
12	Protections to be provided	i) Short circuit ii) Overload
13	Cable Entries	Suitable for PVCSWA with Aluminium conductor, Totally shrouded to avoid risk of electric shock to operating personnel.
14	Execution	Fixed

C. SPECIFICATION FOR 230V (L-L) MINIATURE CIRCUIT BREAKERS

SCOPE

This specification covers requirements for 230V (L-L) Miniature Circuit Breakers suitable for installation in switchboards (MLDBs).

The Miniature circuit breakers shall comply with the latest revision of IS: 8828-1993 except where modified or extended by the provision of this specification and with the relevant parts of standards mentioned below.

OTHER RELEVANT STANDARDS

The other relevant Indian standards are as under:

IS : 3072 : Code of practice for Installation and Maintenance of switchgear.

IS : 4237 : General requirements for switchgear and controlgear for voltages not exceeding 1000V AC.

IS : 10118 : Code of practice for selection, installation and maintenance of Switchgear and Controlgear.

IS : 11353 : Guide for uniform system of marking and identification of conductors and apparatus terminals.

DESIGN CRITERIA

The breakers shall operate on a 230V (L-L) ($\pm 10\%$), 2/3 phase, 50 Hz ($\pm 3\%$) power supply. Fault withstand capacity shall not be less than 9 kA for one second.

The rated carrying capacity shall be as specified in Annexure IB at the rated voltage and frequency and the breaker shall carry this current continuously while complying with this specification.

CONSTRUCTIONAL FEATURES

1) General

The miniature circuit breakers shall have IP-43 protection.

2) **Miniature Circuit Breakers**

The circuit breaker shall have current limiting devices with an inverse time delayed thermal trip device and an undelayed magnetic trip device to take care of steady overload and short circuit faults respectively. The breakers should be suitable for switching/ protection of lighting circuits.

TECHNICAL SPECIFICATION

1	Application	Switch board
2	Number of poles	2 / 3
3	Rated Current	As Required
4	Breaking capacity	10kA (rms) / 9 kA for 1 second
5	Rated voltage	230V (L-L) (+10%)
6	Frequency	50 Hz (± 3%)
7	Enclosure of the breakers	Moulded self extinguishing thermoset plastic.
8	Dolly (Switching lever)	Can be locked in either OFF or ON position.
9	Fixing	Snap fitting
10	Terminals	To take PVC SWA 25 mm ² conductors for the outgoing cables. Incoming terminals shall be connected to bus.
11	Mechanical service life	Not less than 20,000 operations.
12	Electrical endurance at rated load	Not less than 20,000 operations.
13	Climate resistance to confirm requirements of	IEC - 68/2
14	Ambient temperature	As mentioned elsewhere in this document
15	Operating mechanism	Manual Trip Free
16	Tripping Arrangement	Magnetic Short Circuit Release. Thermal Overload Release.

D. SPECIFICATION FOR 230V SWITCH FUSE UNIT

SCOPE

This specification covers requirements for 230V Switch Fuse Units conforming to IS:13947 (Part 3) inclusive of latest amendments, if any. Any material and component not specifically stated in this specification but necessary for trouble free operation of the equipment and accessories specified herein shall be deemed to be included.

DESIGN CRITERIA

The switches shall operate on a 230V (L-L) ($\pm 10\%$), 2 phase, 50 Hz ($\pm 3\%$) power supply. Fault withstand capacity shall be not less than 9 kA for one second.

The rated current carrying capacity shall be as specified below at the rated voltage and frequency and the switch shall carry this current continuously while complying with this specification.

CONSTRUCTIONAL DETAILS

The switches shall be made of two pole, silver tipped copper contacts with steel springs for rapid movement during changeover. The unit shall have suitable interlock type having interlock with switch board door.

The enclosure shall be of steel sheets 1.6 mm thick with aesthetic finish and final coats of paints.

TECHNICAL SPECIFICATION

1	Installation	Switch board
2	No. of Poles	2
3	Service Voltage	230V (L-L) ($\pm 10\%$)
4	Continuous current	As Required
5	Nominal short time current	10 kA (rms)/9 kA
6	Contactor Duty	AC 1
7	Frequency	50 Hz ($\pm 3\%$)
8	Mechanical life	Not less than 3 Million operations.
9	Safety interlock	As mentioned above
10	Enclosure	Sheet Steel 1.6 mm.

E. SPECIFICATION FOR 230V (L-L) LIGHTING DISTRIBUTION BOARD

SCOPE

This specification covers requirements for 230V (L-L) Miniature and/or Residual Current Circuit Breaker suitable for installation in a switchboard (LDB).

The Miniature-Residual Current circuit breaker shall comply with the latest revision of IS: 8828 and the associated switch board shall conform to IS : 8623 with the relevant parts of standards except where modified or extended by the provision of this specification.

OTHER RELEVANT STANDARDS

The other relevant Indian standards are as under:

IS : 3043 : Code of practices for earthing.

IS : 4237 : General requirements for switchgear and control gears for voltages not exceeding 1000V AC.

IS : 10118 : Code of practice for selection, installation and maintenance of Switchgear and Control gear.

IS : 11353 : Guide for uniform system of marking and identification of conductors and apparatus terminals.

IS : 8588 : Thermostatic bimetals

CONSTRUCTION

General

The miniature circuit breakers shall be suitable for mounting in 4 ways/8 ways/ 12 ways/16 ways distribution boards with IP-42 protection.

Enclosure

The enclosure shall be manufactured from at least 2 mm thick steel sheets in aesthetically appealing powder coated finish. The boards are to conform to the requirement of IS: 8623 for factory built assemblies.

Bus bar system

The bus bar system should incorporate integral single piece bar and coupling links to avoid chances of hot spot developing as is possible with bolted construction of bus bar and links. The bus bar system should accept double pole and single pole circuit breakers in any combination of these. The bus bars should be shrouded against accidental contact. The circuit breakers should be arranged in two horizontal or vertical banks with switch levers operating in vertical or horizontal planes for on-off switching. The mounting of breakers should be quick snap and easy removal type without disturbing the other breakers. It should be capable of being connected to at least cable sizes of 25 mm² for phase conductors and 16 mm² for neutral conductors. Two conduit entry plates at the top and the bottom should facilitate drilling of holes at site to suit individual requirements.

F. Miniature/Residual Current Circuit Breakers and Distribution Boards

These breakers shall be current limiting devices with an inverse time delayed thermal trip device and an un-delayed magnetic trip device to take care of steady overload and short circuit and earth leakage faults respectively. The breakers shall be suitable for switching/control/protection/regulation of lighting, control and motor circuits.

The circuit breakers should also be suitable for protection/control/switching of single phase, 230 Volt motors.

TECHNICAL SPECIFICATION FOR MINIATURE / RESIDUAL CURRENT CIRCUIT BREAKERS

1	Applicable standard	IS 8828
2	Number of poles	2 for incoming MCB and RCCB if any. 2 for outgoing for MCB.
3	Rated Current	As Required
4	Breaking capacity	9 kA
5	Rated voltage	230 V for DP
6	Frequency	50 Hz
7	Enclosure of the breakers	Moulded self extinguishing thermo set plastic.
8	Dolly (Switching lever)	Can be locked in either Off or On position
9	Auxiliary contact poles (for control circuits, if any)	230V 5A, A.C. (Optional).
10	Fixing	Snap fitting
11	Terminals	25 mm ² conductors for phase and 16 mm ² for neutral.
12	Mechanical service life	Not less than 20,000 operations.
13	Electrical endurance at rated load	Not less than 20,000 operations.
14	Climate resistance to conform requirements	IEC - 68/2

TECHNICAL SPECIFICATION FOR LDB:

1	Applicable Standard	IS : 8623
2	Bus current carrying capacity	Suitable with DP
3	Enclosure	2 mm thick CRCA sheets.
4	No. of outgoing	As Required
5	No. of incoming	1 No.
6	Mounting	Channel mounted / Flush top cover.
7	Cable entry	Top / Bottom cable entry conduits.
8	Protection	IP 42 (Metallic double door) degree of protection.
9	Finishing	Powder coated finish.
10	Locking	Pad locking facility.

11	Bus bar	Shrouded type integral single piece bus bar.
12	Arrangement of breakers	Vertical/Horizontal arrays.

G. SPECIFICATION FOR SWITCH BOARDS FOR LIGHTING CIRCUITS

SCOPE:

This covers requirements for switch boards for light & fan circuits.

CODES:

The applicable codes are as under:

- IS : 1293 3-Pin, plug and socket outlets
- IS : 3954 Switches for domestic and similar purposes
- IS : 694 PVC unarmoured 660 V grade cable
- IS : 5133 Boxes for enclosure of electrical accessories - Steel and cast iron boxes
- IS : 9224 Low voltage fuses

CONSTRUCTION:

Switch Boards

- i) The switch boards shall be made of 1.6 mm thick, MS sheet with 3 mm, thick decorative bakelite cover. The switch boards shall be provided with earthing terminal, mounting holes and screws, specified number of conduit knock outs on both sides etc. The switch boards shall be suitable for surface mounting. The switchboards shall mount double pole MCBs and sockets.
- ii) The switches shall be Double pole MCBs, quick make quick break suitable for operation on 230 V AC supply.
- iii) The sockets shall be of 5 pin type 5/15 A, 230 V AC socket with 15 A switch.
- iv) The switch boards shall be adequately sized to accommodate switches/fan regulators/sockets. All switch boards mounted items shall be fully wired by 660 V grade PVC insulated flexible Copper wire.
- v) All in-coming and out-going wires shall be suitable for loop in loop out of 4 Sq. mm stranded Aluminum wire and tap off of 1.5 mm² copper wire.

TECHNICAL INFORMATION

- | | | | |
|----|--|---|--------------------------------|
| 1. | Rated Voltage | : | 230 V |
| 2. | No of 5A Double pole MCBs | : | As required |
| 3. | No of 5/15A , 3/5 pin socket with 16A MCBs | : | As required |
| 4. | No. of fan regulators (electronic) | : | As required |
| 5. | Rewirable fuse 5A with base | : | As required |
| 6. | Top cover | : | Decorative Bakelite 3 mm thick |

- | | | | |
|-----|-----------------|---|--|
| 7. | Switch board | : | 1.6 mm thick MS sheet |
| 8. | Internal wiring | : | with 660 V grade by 1.5 Sq mm
Copper cable |
| 9. | Mounting | : | Flush/projected |
| 10. | Earthing | : | Two terminals shall be provided
for earthing by 8 SWG GI Wire |

ANNEXURE : ES-8

A. SPECIFICATION FOR STEEL TUBULAR POLES FOR LIGHTING

SCOPE

This specification covers requirements for swaged type steel tubular poles for outdoor lighting.

The poles shall comply with the requirements of IS: 2713 except where modified or extended by this specification and with the relevant part or standards mentioned below.

OTHER RELEVANT STANDARDS

The other relevant standards applicable are as under :

IS:209	Specification of Zinc
IS :2633	Method of testing weight, thickness, and uniformity of coating on hard dipped, galvanising articles.
IS : 728	Method on determination of weight, thickness and uniformity of coating on galvanised articles other than wires & sheets.
IS : 1573	Specification for zinc plating
IS :5	Colour for ready mixed paints and enamels.

CONSTRUCTION

The tubular poles shall consist of 3 or 4 sections of dimensions conforming to the relevant standard.

The thickness of the steel sheets shall conform to the relevant standards.

The section shall be hard dip galvanised in accordance with the relevant standards.

The section shall be applied with 2 coats of primer and one coat of final paint in accordance with the relevant standards.

In case of swan neck pole, top section shall be curved in accordance with the requirement. The lamp fixture shall freely fit in with the coupler. For other type of poles, the lamp fixture mounted on a bracket clamped on the pole at a height of not less than 7 m from the road surface and projecting at least 1.3 m into the road from the centre of the pole.

The lower most section shall be provided with a base plate having holes for firm fixation in the foundation. The height of the pole shall be 9 m.

The bidder / supplier shall submit the dimensioned drawings for different sections for approval by Purchaser before fabrication.

B. SPECIFICATION FOR MASTS FOR LIGHTING

SCOPE

This specification covers requirements for high masts for outdoor lighting with street light / flood

light fixtures.

CONSTRUCTION

The mast shall comprise the following components :

The mast shall comprise sections of over 6 metre length. Each section shall be made of steel complying with I.S. 226 of appropriate grade, polygonal section, telescopic jointed and fillet welded with the exception of site joints. The welding shall be in accordance with B.S. 5135. Each section shall include one telescopic and welded joint which provides diaphragm stiffness to maintain the structural strength during delivery and in service. The whole mast shall be continuously tapered. A door shall be provided at the base of the mast to permit clear access to winch assembly and power supply sockets. The door shall be weather resistant with a heavy duty lock. The base flange of welded construction shall provide full strength to the mast assembly. The mast shall be delivered to site in sections and joined with sleeve joints. No welded or bolted joints shall be allowed.

The foundation shall be provided by anchor plates with high tensile bolts.

The entire mast section shall be hot dip galvanised in accordance with I.S. 2629. Each section shall be given two coats of primer and one coat of final paint in accordance with shade 631 of I.S. 5.

For installation and maintenance of the top luminaries assembly a winch shall be provided at the base of the mast. The winch shall be completely self sustaining without the need for brakes, springs, or clutches which require adjustment. The winch shall have one or more drums corresponding to number of steel ropes required for suspension of the top luminaries assembly. The drums shall be suitably grooved ensuring tidy rope lay and smooth return of the rope for each lay. At least 4 turns of rope shall remain on a drum when the top luminary assembly is fully lowered.

The winch shall be manually operable and also by power tools incorporating two speed reversible 230 volt single phase 50 Hz AC/DC universal motor coupled by a gear assembly of adequate ratio. The driving spindle shall be positively locked when not in use by a suitable automatic means. The winch shall be self lubricated by an oil bath. The capacity, the operating speed and the recommended lubricant shall be clearly marked on each winch with an indelible label. Each winch shall be supplied in waterproof enclosure.

Separate pulleys shall be mounted on a chassis integral with a sleeve which slips over the top of the mast axially and in azimuth. The pulleys made of non-corrodible material and run on self lubricating bearings with stainless steel spindles shall take on steel wire ropes and electric cables on suitable grooves. Suitable guides and stops shall be provided for the steel wire ropes for correct guiding of the luminary assembly. The pulley assembly along with chassis shall be hot dip galvanised in accordance with relevant code aforesaid. The assembly shall be supplied in a weatherproof enclosure.

Suitable steel wire ropes of the stainless type shall be provided.

Stainless steel stud of diameter not less than 12 mm shall be attached to the mast structure at a convenient point within the base compartment to provide an earthing point.

The luminary assembly shall consist of radial steel conduits for cables supplying power to fixtures. The assembly shall have fixing arms and plates for mounting junction boxes. Junction boxes in two separable halves shall provide supply of power to different fixtures. The assembly shall be provided with buffer arrangements to prevent damage to the mast finish.

Multicore flexible power cables shall be terminated on metal cased plug and sockets in the base compartment of the mast. At the mast head cables shall be connected to the weather proof junction box aforesaid with nylon glands.

Extension leads of multicore cables shall be provided with plug and socket to enable the fixtures to be tested when in the lower most position using base compartment socket supply.

TECHNICAL INFORMATION

1	Height of mast	:	14 M/18M/25M/30M
2	Ground level diameter	:	300 mm/386 mm/ 440 mm/610 mm
3	Top section diameter	:	100mm/100mm/150mm/150 mm
4	Maximum projected area of luminaires	:	0.8sq.metre/0.8sq.metre/ 0.9 sq.metre/2.8 sq. metre
5	Maximum weight of the luminaire assembly	:	150 kg/150 kg/350 kg/350 kg
6	Number of sections	:	2/2/3/3
7	Length of longest section	:	not exceeding 11 metres
8	Luminaire assembly		

This shall comprise :

- a) High mast street light fixtures with aluminium body, integral control gear, lamp holder and variable optic reflector. The fixture shall be of IP 54 construction and suitable for mounting 400 watt HPSV / Metal Halide lamp.
- b) Flood light fixture with aluminium body, integral control gear, lamp holder and cradle with fixture adjuster. The unit shall be of IP 54 construction and suitable for mounting 400 watt HPSV and 1000 watt Tungsten Halogen lamps.

POWER AND CONTROL CABLES

1. **SPECIFICATION FOR 650 / 1100 V GRADE PVC ARMOURED CABLE**

SCOPE

This specification covers requirements for 650 V / 1100 V grade PVC insulated (Heavy duty) armoured Aluminium conductor electric cables.

The cable shall comply with the latest version of IS:1554 (Part 1) except where modified or extended by this specification and with the relevant parts of standards mentioned below.

CODES

The other relevant standards applicable are as under:

- IS : 10418 : Specification of drums for electric cables
- IS : 8130 : Conductors for insulated electric cables and flexible cords
- IS : 3975 : Specification for mild steel wires, strips and tapes
- IS : 5831 : PVC insulation for armouring cables and sheath of electric cables
- IS : 10462 : Fictitious calculation method for determination of dimensions of protective covering of cables. Part I elastomeric and thermoplastic insulated cables
- IS : 2 : Rules for rounding off values
- IS : 10810 : Method of test for cables (Part 0 to Part 63)
- IS : 1885 : Electro technical vocabulary part 32, cables, conductors and accessories
- IS : 4905 : Methods for random sampling.

CONSTRUCTION

Material

- (a) The conductor shall be Aluminum wires conforming to relevant codes and the insulation used shall be Poly Vinyl Chloride (PVC) compound conforming to the requirements of Type A and Type C compound conforming to relevant codes.
- (b) The outer sheath, fillers and inner sheath shall have FRLS property.
- (c) Armouring shall be either of the following types :
 - i) Galvanised round steel wire
 - ii) Galvanised steel strip

The Galvanised steel wires/ ropes shall comply with the requirements of relevant Code. A binder tape on the armour shall be provided.

Constructional features

The conductor shall be of stranded construction complying with class 2 of relevant codes. A protective barrier shall be provided between the conductor and the insulation and this shall be compatible with the insulating material and the operating temperature of 70⁰C.

The conductor with protective barrier shall be provided with PVC insulation applied by extrusion.

The average thickness of insulation shall not be less than 1 mm to 2.4 mm depending upon the nominal area of the conductor. The tolerance of the thickness of insulation shall be such that the smallest of measured values of thickness of insulation shall not fall below 0.2 mm to 0.34 mm respectively.

The values of thickness of inner sheath shall not be less than 0.4 mm to 0.7 mm depending the nominal area of the conductor.

Armouring shall be provided over the inner sheath.

The armour of the cables shall consist of either galvanized round steel wires or galvanized steel strips.

The nominal thickness of steel strips shall be between 0.8 mm to 1.4 mm and the nominal diameter of round armour wire shall be between 1.6 mm to 4 mm.

The thickness of outer sheath shall be between 1.4 mm to 3 mm depending upon the nominal area of the conductor.

2. SPECIFICATION FOR 650 / 1100 V GRADE UNARMoured CABLE

SCOPE

This specification covers requirements for 650 V / 1100 V grade PVC insulated unarmoured Aluminum conductor electric cables for power supply to light & fan circuits.

The cable shall comply with the latest version of IS: 14449 except where modified or extended by this specification and with the relevant parts of standards mentioned below.

CODE

The other relevant standards applicable are as under :

IS : 3961	Recommended current ratings for PVC insulated cables
IS : 5831	PVC insulation and sheath of electric cables
IS : 8130	Conductors for insulated electric cables and flexible cables
IS : 10810	Methods of tests for cables

CONSTRUCTION

Material

- (a) The conductor shall be Aluminum wires conforming to relevant codes and the insulation used shall

be Poly Vinyl Chloride (PVC) compound conforming to the requirements of Type A compound conforming to relevant codes.

- (b) The fillers and sheath shall have FRLS property

Conductor

- (a) The construction of the conductors shall be for fixed wiring and the conductor shall be of stranded construction.
- (b) The conductor shall be provided with PVC insulation applied by extrusion. The thickness of the insulation shall be between 0.7 to 1 mm.
- (c) The sheath shall be applied by extrusion. It shall be applied over the laid up cores fitting closely and shall have FRLS property. It shall be possible to remove the sheath without damage to the sheath. The colour of the sheath shall be Black. The thickness of the sheath shall be between 0.9 to 1.4 mm.

3. **SPECIFICATION FOR 650 / 1100 V GRADE CONTROL CABLE**

SCOPE

This specification covers requirements for 650 V / 1100 V grade PVC insulated armoured copper conductor control cables.

The cable shall comply with the latest version of IS:1554 (Part 1) except where modified or extended by this specification and with the relevant parts of standards mentioned below .

CODES

The other relevant standards applicable are as under:

- IS : 10418 : Specification of drums for electric cables
- IS : 8130 : Conductors for insulated electric cables and flexible cords
- IS : 3975 : Specification for mild steel wires, strips and tapes
- IS : 5831 : PVC insulation for armouring cables and sheath of electric cables
- IS : 10462 : Fictitious calculation method for determination of dimensions of protective covering of cables. Part I elastomeric and thermoplastic insulated cables
- IS : 2 : Rules for rounding off values
- IS : 10810 : Method of test for cables (Part 0 to Part 63)
- IS : 1885 : Electrotechnical vocabulary part 32, cables, conductors and accessories
- IS : 4905 : Methods for random sampling.

CONSTRUCTION

Material

- (a) The conductor shall be Copper wires conforming to relevant codes and the insulation used shall be Poly Vinyl Chloride (PVC) compound conforming to the requirements of Type A and Type C

compound conforming to relevant codes.

- (b) The outer sheath, fillers and inner sheath shall have FRLS property
- (c) Armouring shall be either of the following types :
 - a) Galvanised round steel wire
 - b) Galvanised steel strip

The Galvanised steel wires/ ropes shall comply with the requirements of relevant Code.

Constructional features

The conductor shall be of stranded construction complying with class 2 of relevant codes. A protective barrier shall be provided between the conductor and the insulation and this shall be compatible with the insulating material and the operating temperature of 70⁰C.

The conductor with protective barrier shall be provided with PVC insulation applied by extrusion.

The average thickness of insulation shall not be less than 0.8 mm to 0.9 mm depending upon the nominal area of the conductor. The tolerance of thickness of insulation shall be such that the smallest of measured values of thickness of insulation shall not fall below 0.18 mm to 0.19 mm respectively.

Core identification shall be made by colour scheme of PVC insulation as per relevant code.

The values of thickness of inner and outer sheath shall not be less than 0.3 mm and 1.24 mm respectively.

Armouring shall be provided over the inner sheath.

The armour wires/strips shall be applied as closely as practicable.

The armour of the cables shall consist of either galvanized round steel wires or galvanized steel strips.

The nominal thickness of steel strips shall be between 0.8 mm to 1.4 mm and the nominal diameter of round armour wire shall be between 1.4 mm to 4 mm.

4. TECHNICAL INFORMATION

650 / 1100 V GRADE PVC ARMoured CABLE

Applicable Code	IS 1554 (Part-1)
Cable Code	AYFY
Voltage Grade	650 / 1100 V
Conductor Size	As required
No. of Cores	3/3.5/4
Sheathing	FRLS

650 / 1100 V GRADE UNARMoured CABLE

Applicable Code	- IS 694
Cable Code	- AYY
Voltage Grade	- 650 / 1100 V
Conductor Size	- As required
No. of Cores	- Two/Three/Four
Sheathing	- FRLS

650 / 1100 V GRADE CONTROL CABLE

Applicable Code	IS 1554 (Part-1)
Cable Code	YWY/YFY
Voltage Grade	650 / 1100 V
Conductor Size	1.5 mm ² (for internal wiring)/2.5 mm ² (for external connections)
No. of Cores	As required
Sheathing	FRLS

SPECIFICATION FOR ACCESSORIES OF CABLING

SCOPE

This covers requirements for accessories of cabling work like cable trays, cable ladders, PVC & Steel conduits and fittings, support systems.

CODE

The applicable codes are as under:

IS 732	Code of practice for electrical wiring
IS 513	Cold rolled low carbon steel and strips.
IS 1079	Hot rolled carbon steel and strips.
IS 9537	Conduits for electrical installation.
IS 2667	Fittings for rigid steel conduits for electrical wiring.
IS 8309	Compression type tubular terminal ends for Aluminium conductors of insulated cables .
IS 2629	Recommended practice for hot dip galvanizing.
IS 2633	Methods for testing uniformity of coating of Zinccoated articles.
IS 1367	Technical supply conditions for threaded steel fasteners.
IS 1663	Method for tensile testing of steel sheet & strip of thickness 0.5 mm to 3 mm.

CONSTRUCTION

Cable trays, fittings and accessories

- i) In RCC trenches, the cable trays shall be of cantilever construction, with one or multi tiers complete with matching fittings (like elbows, bends, reducers, tees, crosses, etc.), accessories (like side coupler plates etc.) and hardware (like bolts, nuts, springs, washers, etc.) as may be required. In vertical sections the trays shall be of ladder construction with one or multi tiers complete with matching fittings (like elbows, bends, reducers, tees, crosses etc.), accessories (like side coupler plates etc.) and hardware (like bolts, nuts, springs, washers, etc.) as may be required.
- ii) Cable trays, fittings and accessories shall be fabricated out of rolled Mild Steel sheets free from flaws such as laminations, rolling marks, pitting etc. conforming to relevant codes. Minimum thickness of Mild Steel sheets used for fabrication of cable trays and fittings shall be 2mm. The thickness of side coupler plates shall be minimum 3 mm. These shall be hot dip galvanized.
- iii) Cable trays in the RCC trenches shall be of standard width 250 / 300 / 450 / 600 mm and of standard lengths 2.5 meter. Cable ladders shall be of widths varying between 150 / 300 / 450 / 600 mm and of standard lengths 2.5 meter.
- iv) Each size and type of cable tray / ladder of 2.5 meter length and 250 mm width simply supported at the ends and uniformly loaded @ 76 kg. per meter shall not have deflection at the mid span exceeding 7 mm.

Support System for Trays and Cables

The support system shall be fabricated from standard structural steel members. The cable trays and support system shall be painted after installation with one coat of red lead primer, one coat of oil primer followed by two finishing coats of Aluminum paint.

Conduits, Fittings and Accessories

Conduits offered shall be rigid steel & PVC complete with fittings and accessories (like bends, check nuts, sockets etc.). The size of the conduit shall be selected on the basis of maximum 40% fill factor and in accordance with relevant code .

i) **Rigid Steel Conduits**

Rigid steel conduits conforming to relevant codes shall be threaded on both sides and suitable for mechanical stresses. Conduits shall be smooth at inside and outside. Conduits shall be plugged by PVC caps at the ends for storage and transportation. Outer surface of conduit shall be hot dip galvanized and shall have high protection against corrosive and polluting substances. Inner surface of a conduit shall be protected against corrosion and polluting substances by hot dip galvanising. Fittings and accessories shall also be hot dip galvanised.

ii) **Junction / Joint Boxes & power receptacles circuits**

Junction Box/cable joint boxes with IP:55 degree of protection, shall comprise a case and a detachable cover or hinged doors constructed out of cold rolled steel sheet of minimum thickness 2 mm. Top of the boxes shall be arranged to slope towards rear of the box. Gland plate shall be 3 mm thick sheet steel with neoprene/synthetic rubber gaskets. All junction boxes shall be suitable for mounting on walls, columns & structures. The boxes shall include brackets, bolts, nuts, screws, glands, lugs, earthing stud required for erection. Terminal blocks in side a junction box shall be of 660 volts grade. It shall be complete with insulating barriers, clip-on-type terminal numbering for wiring diagrams & arranged to facilitate easy termination. Twenty percent spare terminals shall be provided in each terminal block.

iii) **Cablings Accessories:**

a) **Cable Glands:**

Cable glands shall be single compression type suitable for the voltage grade of cables and as per relevant codes. The glands shall be of robust construction capable of clamping cable and cable armour firmly. All washers and hardware shall be made of brass with nickel chrome plating. Rubber components shall be of neoprene.

b) **Cable Lugs :**

Cable lugs shall be tinned copper solder or crimping type suitable for the voltage grade of cables suitable for Aluminum conductor cables and copper conductor control cables.

c) **Galvanising**

Galvanising of steel components and accessories shall conform to relevant codes. The amount of zinc deposit over threaded portion of bolts, nuts, screws and washers shall be as per relevant codes.

d) **Painting**

Cable supports and cable trays mounting structures and all other non galvanized parts shall be brushed before giving one coat of red lead primer, one coat of oil primer followed by two finishing coats of Aluminium paint.

SPECIFICATION FOR 415 V / 230 V POWER RECEPTACLES**1. SCOPE**

This specification covers the requirements for 415 V power receptacles incorporating switches, sockets and plugs.

The receptacles shall comply with the latest version of IS 8623 except where modified or extended by this specification and with the relevant parts of standards mentioned below.

2. OTHER RELEVANT STANDARDS

The other relevant standards applicable are as under :

IS :6875	Switches and push-buttons
IS :13703	LV fuses for voltages not exceeding 1000 V AC
IS :2147	Degree of protection provided by enclosures for low voltage switchgear and control gear
IS :3043	Code of practice for earthing
IS :2629	Hot dip galvanising
IS :5082	Wrought Aluminum and Aluminum alloys for electrical purposes
IS :1248	Electrical Indicating instruments
IS :5	Colours for ready-mixed paints and enamels.
IS :1554	PVC insulated cables for working voltages upto and including 1100V
IS :2551	Danger Notice Plates
IE Rules	1956

3. DESIGN**Electrical**

The receptacle shall be designed to ensure continuous operation at rated capacity at service condition and fault withstand capacity of 9 kA.

Mechanical

The receptacle shall be designed to ensure ready interchangeability of components and easy accessibility to components for inspection & maintenance.

4. CONSTRUCTION

The receptacle shall comprise single front panel, metal enclosed, dust & vermin proof floor mounted and free standing type. The frame shall be fabricated from suitable mild steel sheets of thickness not less than 2.0 mm. The frames shall be covered by cold-rolled steel sheets of thickness not less than 1.6 mm. Doors and covers shall also be of cold rolled sheets of thickness not less than 1.6 mm.

The panels shall be provided with a degree of protection IP 55.

The panel shall be supplied with base frames made of mild steel section along with all necessary mounting hardware required for welding down the base frame to the foundation/steel insert plates. The base frame height shall be such that floor finishing (50 mm thick) after erection of the board does not obstruct the movement of doors, covers withdrawable modules etc.

The panel doors shall open by at least 90 degree.

The ON / OFF switches in a receptacle shall be rotary type, heavy duty, double break, AC 23 category, suitable for AC supply.

Plug and socket shall be of shrouded die cast Aluminum. Sockets shall be provided with lid safety cover.

Robust mechanical inter-lock shall be provided such that the switch can be put ON only when the plug is fully engaged. Plug can be withdrawn only when the switch is in OFF position. Additional inter-lock should be provided such that covers can be opened only when the switch is in off position.

Wiring inside the receptacles shall be carried out with 1100 V grade PVC insulated stranded Aluminum conductor.

Terminal block in the receptacles shall be of 1100 V grade, clip on stud type, moulded in Melamine, suitable for terminating specified cable size. All the terminals shall be shrouded.

Receptacles shall include switches, sockets & plugs mentioned as under:

230V, 5A, SP, 2 Pin

230V, 20A, SP, 3 Pin

415V, 20A, TP, 3 Pin

415V, 63A, TPN, 5 Pin

Galvanised steel earth bus shall be provided at the bottom welded / bolted to the bottom of a panel.

Suitable arrangement shall be made at each end of the earth bus for bolting to earthing conductors. All joint splices to earth bus shall be made through atleast two bolts and taps by proper lug and bolts connection.

All non-current carrying metal work in a panel shall be effectively bonded to the earth bus.

Name plates and labels

- a) The receptacle shall be provided with prominent, engraved identification plates.
- b) The name plates shall be of non rusting metal with white non graved letterings on black back grounds. Inscriptions shall be subject to purchaser's approval.

- c) Caution plate with the inscription "WARNING LIVE TERMINALS" shall be provided on the front face of a receptacle. .

Painting

The sheet steel work shall be pre treated in accordance with relevant code. Finishing paint on panels shall be shade 692 (smoke grey) in accordance with relevant code. The inner surface of the panels shall be glossy white. All hardware shall be nickel chromium plated or zinc passivated.

SPECIFICATION FOR EARTHING & LIGHTNING PROTECTION SYSTEM**1. SCOPE**

This specification covers the requirements for earthing system. Earthing system shall be in strict accordance with IS: 3043 and Indian Electricity Rules / Acts (amended up to date) .

2. SYSTEM DESCRIPTION

Double earthing system shall be provided for earthing of equipment and buildings.

The earthing system shall consist of suitable nos. of earth pits and earthing conductors located in & around the sub-station buildings and the plant.

Neutral of the transformer shall be connected separately and solidly with at least two earth pits near the transformer.

Inter connected pits shall be provided for frame earthing of all equipments and cable trays/ladders, metallic conduits, steel tubular poles, trusses & structures over which cables run.

Independent pits shall be provided for earthing of transformer neutrals and down conductors of lightning masts.

3. CONSTRUCTION

The primary requirements of the earthing system are as follows:

Neutral of a transformer shall be effectively connected to an independent earth pit by copper flat 65 x 8 mm.

Down conductor of a lightning mast shall be effectively connected to an independent earth pit by GS flat 65 x 8 mm

Frame work of equipment shall be effectively connected to nearest pit by two separate GS flats or a combination of GS flats & wires of the sizes mentioned below:

Equipment	Earth conductor buried in earth	Earth conductor above ground level & in built up trenches
a) Main earth grid	40 mmdia MS Rod	65 x 8 mm GS flat
b) 415 V/230 V Switch boards	Not applicable	50 x 6 mm GS flat
c) Neutral point of transformer		65 x 8 mm copper flat
d) LT motors above 125 kW	Not applicable	50 x 6 mm GS flat
31 kW to 125 kW	Not applicable	25 x 6 mm GS flat
1 kW to 30 kW	Not applicable	25x6 mm GS flat

Equipment	Earth conductor buried in earth	Earth conductor above ground level & in built up trenches
Fractional Horse Power	Not applicable	8 SWG GS wire
e) Columns, structures, cable trays, bus duct enclosures, steel tubular poles & Towers	Not applicable	50 x 6 mm GS flat
f) Crane gantries and other non-current carrying metal parts	Not applicable	25 x 6 mm GS flat

Each earth pit shall have MS pipe electrode not smaller than 38 mm dia. The buried length of the electrode shall not be less than 2.5 meters. Each electrode shall be buried vertically in an earth pit of minimum 300 mm x 300 mm area and 3 meters depth preferably by using homogenous mixture of bentonite clay and soil in the ratio of 1:3. The distance between two earth pits shall be maintained at least double the length of the electrode pipe and earth pits shall be constructed away from drains.

Each pit shall be provided with a cast iron top cover for inspection & identification.

All conductors for earthing shall be made of Galvanised Steel (GS) on surface and of Mild Steel (MS) when planted below soil.

The grids inter connecting the pits shall have an area not less than 300 Sq mm and be buried at a depth not exceeding 600 mm below the soil. Back filling shall be placed in layers of 150 mm. Earthing conductors embedded in the concrete floor of the building shall have approximately 50 mm concrete cover.

The Bidder shall design and install the grounding system in the entire plant Complex including sub-station buildings. Excavation in rock/soil or both and back good earth filling required for the construction shall be in the scope of the bidder.

Metallic frame of all electrical equipment shall be earthed by two separate and distinct connections to earthing system each of 100% capacity. Crane rails, metal pipes and conduits shall be effectively earthed at two points. Steel RCC columns, metallic stairs, hand rails etc. of the sub-station building housing electrical equipment shall be connected to the nearby earthing grid conductor by one earthing ensured by bonding the different sections of hand rails and metallic stairs. Metallic sheaths, screens, armour of all cables shall be earthed at both ends.

Each continuous laid out lengths of cable tray shall be earthed at minimum two places by GS flats to the earthing system, the distance between earthing points shall not exceed 30 meter. Different sections of cable trays shall be connected by low resistance connecting links. The neutral of transformer shall be connected to neutral of LT switchgear.

Neutral connections and metallic conduits/pipes shall not be used for the equipment earthing. Lightning protection system down conductors shall not be connected to other earthing conductors above the ground level.

Connections between earth leads and equipment shall normally be of bolted type.

A minimum earth coverage of 300 mm shall be provided between earth conductor and the bottom of trench/foundation / underground pipes at crossing. Earthing conductors crossing the road can be installed in hume pipes. Wherever the earthing conductor crosses onruns at less than 300 mm distance along metallic structures such as air, water, pipe lines, steel reinforcement in concrete, it shall be bonded to the same.

Earthing conductors along their run on columns, walls, etc. shall be supported by suitable welding / cleating at interval of 1000 mm and 750 mm respectively.

4. LIGHTNING PROTECTION SYSTEM

Lightning protection system shall be in strict accordance with IS:2309.

Lightning masts shall be provided on any structure having height 15 meter or more. The height of the masts above its fixing point on the structure shall be 2 meter. The spacing between two adjacent masts shall not be less than 20 meter.

Lightning conductor shall be of 25 x 6 mm GS strip when used above ground level. It shall be connected through test link with earth electrode/earthing system.

The Bidder shall furnish the details including typical arrangement drawings for the lightning protection system offered.

Down conductor shall not be connected to other earthing conductors above ground level. The size of down conductor of each mast shall not be lower than 65 x 8 mm. Each down conductor shall be effectively connected to independent earthing pit.

Each down conductor shall be provided with a test link at 1000 mm above ground level for testing.

All joints in the down conductors shall be of welded type.

Down conductors shall be cleated on outer side of building wall, at 750 mm interval or welded to outside building columns at 1000 mm interval.

Lightning conductor on roof shall not be directly cleated on surface. Supporting blocks of PCC/insulating material shall be used for conductor fixing.

All metallic structures within a vicinity of two meters of the conductors shall be bonded to conductors of lightning protection system.

The lightning protection system shall not be through cables, conduits and metal enclosures of electrical equipment.

Lightning conductors shall not pass through or run inside GI Conduits.

Testing link shall be made of galvanised steel of size 25 x 6 mm.

SPECIFICATION FOR CENTRALISED WELDING SYSTEM**1. General**

Centralised welding circuit comprising two nos. transformer welding sets shall be envisaged for proposed plant.

From these welding sets the welding circuit shall be fed in such a way that, the power for welding shall be available immediately after inserting the plug to the socket outlet with 50 meters length of extra welding cable. The Welding system shall be provided on each floor of the plant . The Bidder shall give the quantity, location and specification of the socket cum switch in the offer. The location of socket shall be such as to facilitate welding at any point in the plant .

The welding circuit shall have suitable metallic socket connection at suitable intervals to cover the complete area for which it is to be provided. While designing the welding circuits necessary consideration shall be taken to avoid voltage drop.

The system shall comprise of 2 nos. welding machines, PVC cable of suitable size in form of ring main for power and 75 mm x 6 mm MS Flat in form of earth bus around the area for which it is installed. The system shall have adequate nos. socket outlet of adequate capacity for direct connection of welding cable through plugs. Earthing connection of welding machine shall be connected to the earth ring main through insulated cable to avoid flow of welding current through structures, foundation bolts etc. Size of earth bus is tentative and subject to change during detail design stage.

The welding sets shall be complete with accessories like electrode and ground cables, electrode holder, earthing clamps, leather hand gloves and face shield with lens. The welding sets shall be located in welding transformer room of 2 x 3x 3 m .

2. Transformer welding set

Air cooled, aluminum wound arc welding transformers shall be envisaged for welding system of the plant . The transformers shall be suitable for 415 V \pm 10%, 3 phase, 50 Hz AC supply system. The transformers shall be designed for output of approximate 80 Amps to 450 Amps at 80 volt open circuit and 180 Amps to 350 Amps at 100 volt open circuit covering an electrode range from 2.5 mm to 6 mm. However, the exact values of the range should be quoted by the Bidder in the offer. The welding set shall be provided with a current selector plate and a cable reel for winding up the welding cable when not in use. Provision shall be made for easy lifting of the welding sets.

SPECIFICATION FOR CAPACITOR BANKS**1. SCOPE**

- 1.1 This specification covers requirements for 415 V shunt capacitor banks suitable for indoor installation.
- 1.2 The capacitor banks shall comply with the latest version of IS: 2834 and IEC-831-1 & 831-2 except where modified or extended by the provision of this specification and with the relevant parts of standards mentioned in clause 2.0.

2. OTHER RELEVANT STANDARDS

The other relevant Indian Standards are as under:

IS : 12672 Internal fuses and internal over pressure disconnectors for shunt capacitors

IS : 9046 A.C. contactors of voltages above 1000 V up to and including 11000V

IS : 13118 General requirements for circuit breakers for voltages above 1000V

IS : 9920 Switches and switch isolators for voltages above 1000 V

IS : 13947 L.V. switch gear and control gear (Part 4 section 1- contactors)

IS : 13947 L.V. switch gear and control gear (Part 3 - switches)

IS : 13947 L.V. switch gear and control gear (Part 2 - circuit breakers)

IS : 9402 High voltage fuses for the external protection of shunt capacitors

IS : 13703 L.V. Fuses for voltages not exceeding 1000V A.C.

IS : 3043 Code of practice for earthing

3. DESIGN

The capacitor units shall be designed for the following :

- (a) Watt losses between 0.2 to 0.5 W per kVAR
- (b) Temperature withstand category of 55⁰ C
- (c) Output (kVAR) tolerance not exceeding 10 %
- (d) Capacitor - fuse co-ordination to reduce risk of tank rupture
- (e) Use of bio degradable eco friendly dielectric compound
- (f) Switching life not less than 60,000 operations

4. CONSTRUCTION

- 4.1 The basic units shall be made of dielectric compound polypropylene film impregnated with non-PCB bio-degradable liquid. Foil shall be preferred over paper for better heat dissipation and lower operating temperature.
- 4.2 The basic units shall be insulated for power frequency withstand voltages.
- 4.3 The basic units shall be provided with protection against sustained overload, earth fault and

voltage/current unbalance, self healing type pressure sensitive detector for sensing excessive internal pressure, pressure activated tripper switch for tripping, discharge resistors and automatic power factor correction relay.

- 4.4 Each unit shall be supplied in a M.S. container with enamel paint finish.
- 4.5 Each element of capacitor unit shall have its own built in special fuse. In case of fault in an element, the over voltage on the remaining elements shall not exceed 10%. Internal discharge resistance shall be provided to limit the residual voltage to less than 50 volt as per relevant standard.
- 4.6 The capacitor banks shall be designed to withstand electro-dynamic and thermal stresses caused by transient over currents during switching.
- 4.7 To eliminate unduly frequent switching when peak load of short duration occur, a time relay shall be provided.
- 4.8 Zero voltage relay shall be provided to reset the control devices to their neutral position, so that on restoration of supply after any supply interruption, the capacitor stages are switched on again without any undesirable current and voltage peak.

5. **PERFORMANCE**

- 5.1 The unit shall deliver rated output within the limits of watt losses indicated in clause 3.0 without over heating within the limits of ambient temperature indicated in clause 2.1.6.
- 5.2 The Capacitor Banks shall be grouped in different kVAR rating, which shall be switched ON/OFF as required according to load connected. For this purpose capacitor kVAR shall be subdivided into a number of regulating stages. The regulating stages shall be switched ON/OFF by means of suitable relay to ensure the system power factor to 0.98 lagging. To eliminate unduly frequent switching when peak load of short duration occur a time delay relay shall be incorporated for stage to stage switching. In case of supply interruption a NO volt relay shall set the control devices to their neutral position. The tenderer shall also provide necessary reactive power relay, No volt relay, control devices and switching devices mounted separately in a dust tight vermin proof sheet metal enclosed cubicle suitable for floor mounting. This cubicle shall also be provided with other devices, such as, current and voltage transformer, protective relays, voltmeter, ammeter with selector switch, auxiliary relay etc., which are essential for automatic switching of capacitor banks.

All internal wiring for control sensing instruments, relays etc. shall be done with 650V grade, PVC insulated copper conductor of size not less than 2.5 mm². The capacitor bank shall be rated for continuous operation and shall be suitable for indoor installation.

The Bidder shall indicate the level of improved power factor in the offer.

TECHNICAL SPECIFICATION

1.	Applicable Standard	IS : 2834
2.	System	415 V, 3 phase 50 Hz solid earthed system
3.	Location	Indoor
4.	No. of phases	Three
5.	Connection	Star / Delta
6.	Output kVAR	As required
7.	Insulation level	3 kV for One minute
8.	Overload	1.3 times rated current continuously
9.	Losses	Less or equal to 0.5 W / kVAR
10.	Output tolerance	10 % (Max)
11.	Inrush Current	Not exceeding 100 times rated current
12.	Peripherals to be supplied	Discharge resistors, HRC Fuse, Racks, Isolators
13.	Accessories	Control Panel with Automatic P.F. Correction relay
14.	Discharge device	Discharge Resistor
15.	Container	MS Sheet at least 3 mm thick

ANNEXURE : ES-14

SPECIFICATION FOR MISCELLANEOUS ITEMS

The following general requirements shall be applicable to all the miscellaneous items furnished under these specifications.

1. Emergency Power Supply

For emergency power supply the following shall be provided :

- a) Air cooled type generator.
- b) Auto-cum-Manual starting of generator in case of power failure.
- c) Separate wiring should be provided from generator to strategic locations.
- d) Additional emergency lights shall be provided to other locations as per direction of site engineer, if felt necessary, within the maximum load of 5 kW.
- e) Inverter emergency lights shall be provided in the switch room and control room.
- f) For emergency light, minimum requirement of illumination level shall be 10 Lux. However, actual requirement shall be worked out by bidder.

2. Pressurisation and Air conditioning

The switch room of the plant shall be pressurised from inside to prevent dust entry with conditioning of inlet air (no. of air changes not less than 15) and humidity shall be controlled to ensure proper working of equipment and operating personnel inside the room. Requisite number of exhaust fans and ceiling fans shall be provided in rooms to ensure proper working conditions for equipment and personnel in the rooms in case of failure of pressurisation .

The control room shall be air conditioned using required numbers of split type air conditioners of adequate capacity.

3. FIRE FIGHTING SYSTEM :

The switch room and all strategic points of the plant shall be provided with fire fighting equipment of the following class:

Class B (Foam type) : IS : 933

Class A (Soda Acid) : IS : 934

ClassBC (Dry Powder) : IS : 933

The equipment shall be portable, wall mounted with refilling and recharging facility from time to time.

4. MISCELLANEOUS:

4.1 Painting:

All electrical equipment should be painted as per relevant code in accordance with respective manufacturer's standard practice.

4.2 Standards:

The electrical equipment included in this tender shall comply with relevant IS specifications and IS code of practice. In the absence of IS, BS, any other standard of repute shall be followed.

4.3 **Tests:**

The offer shall include all test certificates as required by ISS and Indian Electricity Rules.

4.4 **Tools & Tackles:**

Tenderers shall quote separate price for standard tools and tackles required for maintenance of the electrical equipment. This shall also include the necessary measuring instruments, rubber mats & gloves etc.

4.5 **Fitting & Spares:**

All standard fittings should be provided. The tenderer shall quote item-wise unit price for spare parts.

4.6 **Technical Particulars:**

The supplier shall furnish the technical particulars duly filled as given elsewhere.

4.7 **Guarantee:**

All the supplies should be guaranteed for a period of one year from the date of installation and commissioning.

4.8 **Deviations:**

Deviations if any, from these specifications shall be clearly indicated in the offer.

5. **Completeness of Offer:**

The details given in the write-up / specifications (including drawings) in respect of electrical system / equipment are indicative, not exhaustive. The electrical system/equipment shall co-ordinate with mechanical system/equipment of the plant.

If any electrical component or equipment with associated wiring is considered necessary and desirable as per Indian Electricity Rules amended up to date read with various circulars issued by the Director General of Mines Safety, Dhanbad, or if the same is considered necessary and desirable to comply with the up-to-date engineering practices or with various Indian codes of Practices issued by the I.S.I. New Delhi from time to time the same shall be deemed to be a requirement of this tender specifications and same should consequently included in the offer not-with-standing the fact that such requirements are not clearly or specifically indicated in these specifications along with the associated drawings.

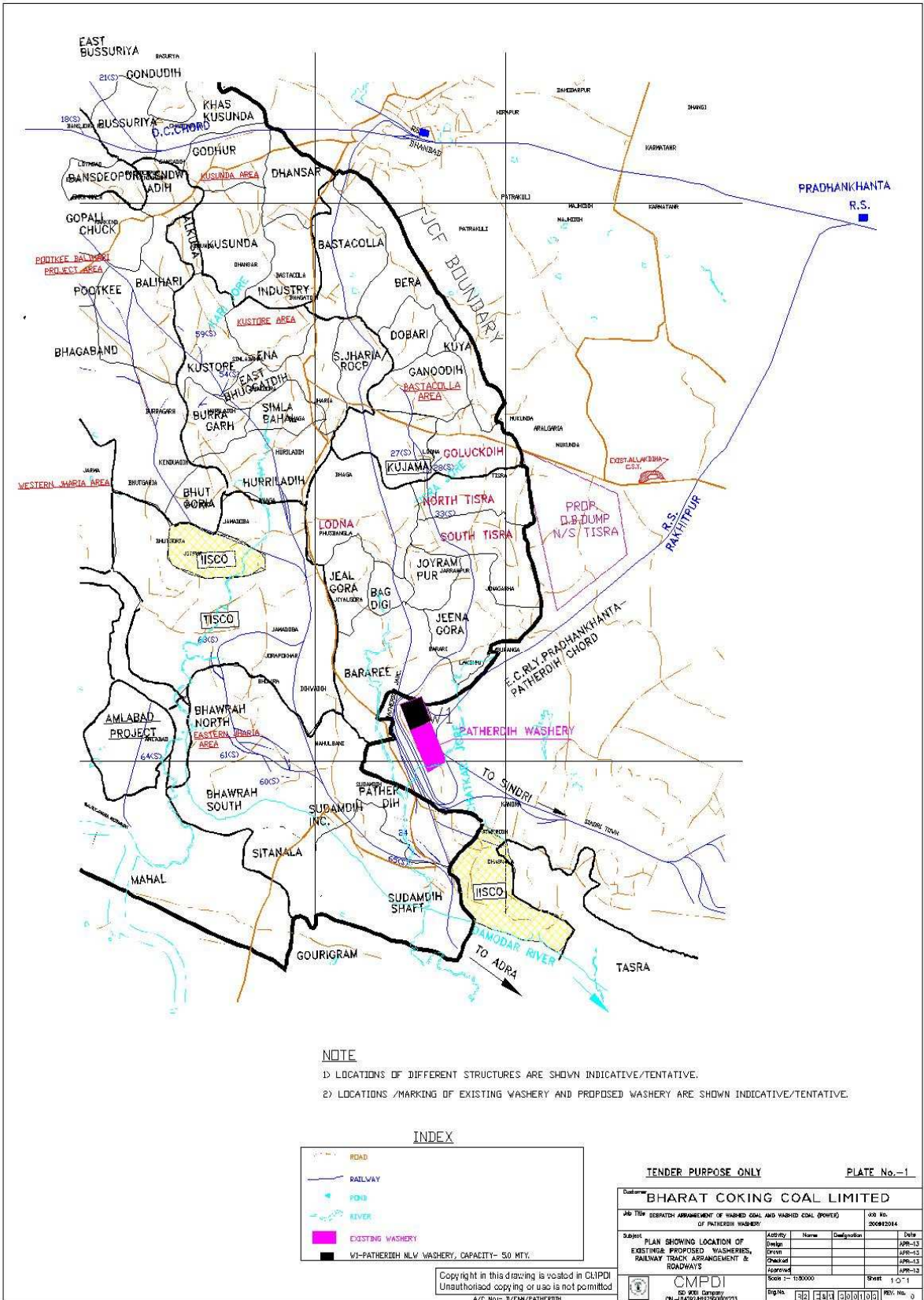
All the equipment attachments, required for the execution of works as per scope of work as envisaged in the document shall be designed, fabricated erected and maintained for efficient and satisfactory performance, and the bidder shall be solely responsible for the same and the same shall be deemed to be within the scope of the offer/work whether specifically mentioned or not in these documents and the bidder shall not be eligible for any extra claim on this issue.

SUB-SECTION-4.5

LIST OF DRAWINGS

LIST OF DRAWINGS

Sl. No.	Subject	Plate No.	Drawing No.
1	Location plan showing washery, roads, siding and mines	1	R2/E&M/300103
2	Location and loading point	2	R2/E&M/300105
3	Plan & Sec. elevation of loading point	3	R2/E&M/300095
4	Schematic Single Line Diagram of Power Supply Arrangement	4	R2/E&M/200104



NOTE
 1) LOCATIONS OF DIFFERENT STRUCTURES ARE SHOWN INDICATIVE/TENTATIVE.
 2) LOCATIONS /MARKING OF EXISTING WASHERY AND PROPOSED WASHERY ARE SHOWN INDICATIVE/TENTATIVE.

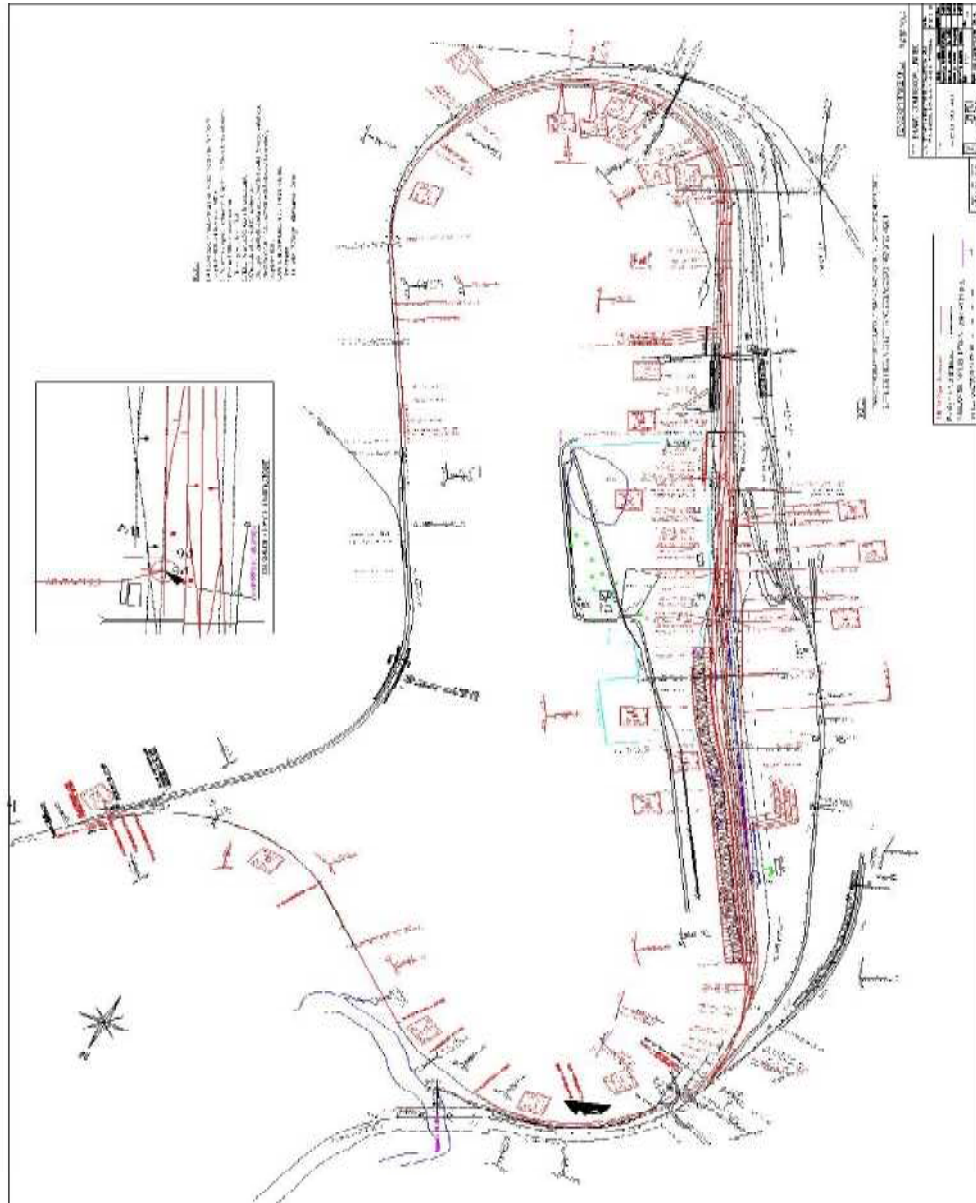
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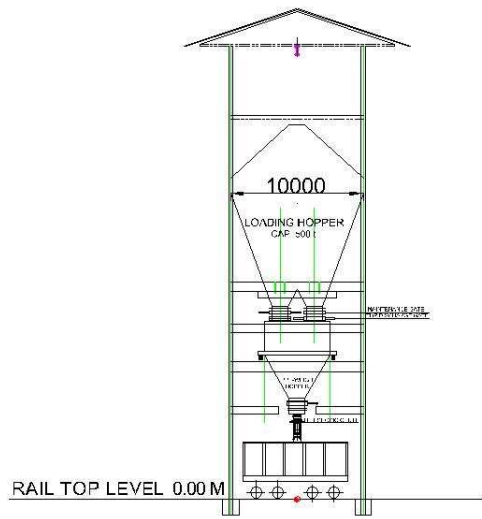
	ROAD
	RAILWAY
	POND
	RIVER
	EXISTING WASHERY
	N/W-PATHERDI N.W. WASHERY, CAPACITY- 50 MTP.

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 A/C No- B/2EM/PATHERDI

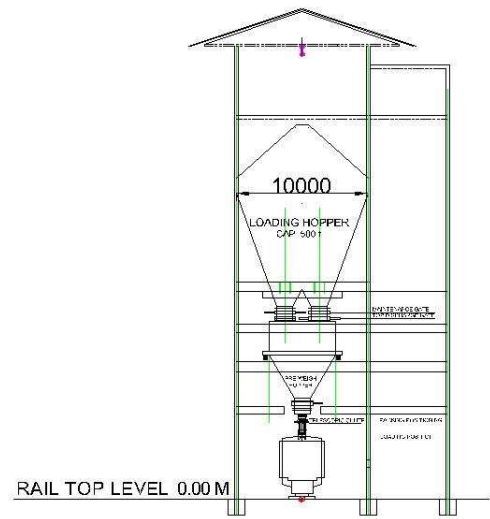
TENDER PURPOSE ONLY PLATE No.-1

Customer BHARAT COKING COAL LIMITED				Job No. 80082014	
Job Title DEBATCH ARRANGEMENT OF WASHED COAL AND WASHED COAL (PROVE) OF PATHERDI WASHERY				Job No. 80082014	
Subject PLAN SHOWING LOCATION OF EXISTING PROPOSED WASHERIES, RAILWAY TRACK ARRANGEMENT & ROADWAYS	Activity	Name	Designation	Date	
	Drawn			APR-13	
	Checked			APR-13	
	Issued			APR-13	
Scale :- 1:50000			Sheet	1 of 1	
CLIPDI Civil Engineering CL-0402649750200723			Rev. No.	0	

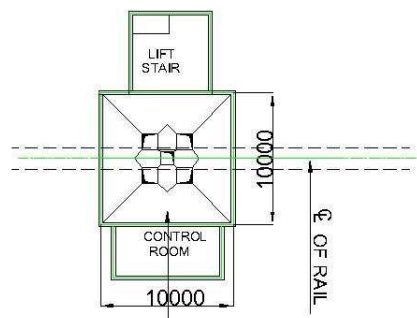




ELEVATION



SIDE ELEVATION



PLAN

- NOTE :**
1. DIMENSIONS AND LEVELS SHOWN ARE TENTATIVE AND ARE SUBJECT TO CHANGE DURING DETAIL ENGINEERING BASED ON ACTUAL SITE CONDITION & EQUIPMENT DETAILS.
 2. DIMENSIONS SHOWN ARE IN MILLIMETRES AND LEVELS ARE IN METRES.
 3. PRELIMINARY DRAWING NOT TO BE USED FOR CONSTRUCTION PURPOSES.
 4. CONTROL ROOM, LIFT AND STAIR SHALL BE SUITABLY LOCATED CONSIDERING THE ALIGNMENT OF RAILWAY LINE.
 5. INCOMING FEED BELT CONVEYOR AND DISCHARGE CHUTE ARE NOT IN THE SCOPE OF THIS TENDER.
 6. AFTER DISCUSSION WITH BCL & BOWO, CORNER STRUCTURE SUPPORTING THE HOPPER SHED ALONG THE CONVEYOR BELT, IS TO BE SUITABLY POSITIONED / STRENGTHENED BY THE SUCCESSFUL BIDDER FOR PASSAGE OF INCOMING FEED BELT CONVEYOR.

TENDER PURPOSE ONLY

PLATE NO.-3

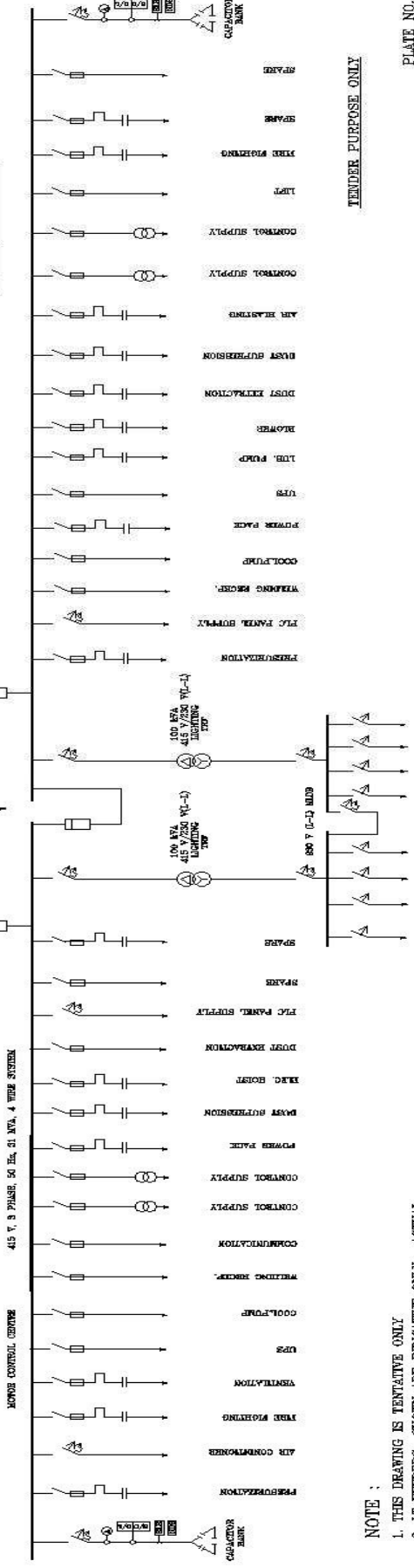
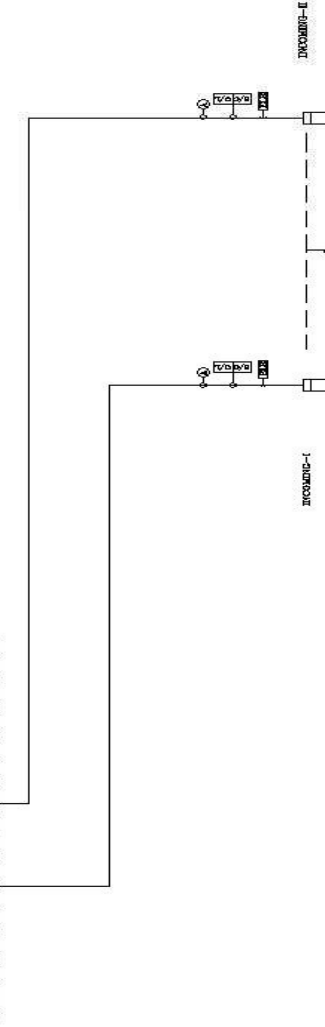
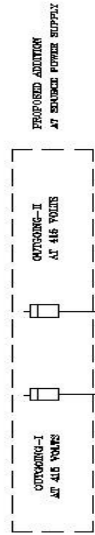
Customer BHARAT COKING COAL LIMITED			
Job Title	DESPATCH ARRANGEMENT OF WASHED COAL AND WASHED COAL(POWER) OF PATHERDIH NLY WASHERY		Job No
			200912014
Subject	Approved by	Approved Date	Approved
	Drawn by	Drawn Date	Drawn
	Checked by	Checked Date	Checked
	Released by	Released Date	Released
Title		Scale	Sheet
CMPDI		NTS	1 OF 1
ISO 9001 Company			
CIN-U1432JH1975G0001223			
No. R2		E8	300005
			Rev. No 5

LEGEND

SL. NO.	SYMBOL	DESCRIPTION
1		VOLTMETER
2		AMMETER
3		INTERLOCKING
4		NO START MOTOR
5		NO START INVERTER
6		TRANSFORMER
7		BLASTING
8		BLOW STROKE
9		BLow STROKE DELAY
10		STOP CIRCUIT RELAY

SL. NO.	SYMBOL	DESCRIPTION
11		OVER LOAD RELAY
12		AIR CIRCUIT BREAKER
13		CONTACTOR
14		MOULDING CARBIDITY BREAKER
15		OT
16		INTERLOCKING
17		STROKE PULSE
18		NORMAL O/A VTR SEP
19		MCP

TERMINAL BOX - DRAWING (NAME, NUMBER, QTY, EACH) LABELLED POINT (I, O, NUMBER)



TENDER PURPOSE ONLY

- NOTE :
1. THIS DRAWING IS TENTATIVE ONLY
 2. LT FEEDERS SHOWN ARE INDICATIVE ONLY. ACTUAL TO BE DECIDED DURING DETAILED DESIGN STAGE

PLATE NO. 4

BHARAT COOKING COAL LTD.

APR 2016 REVISION WORKSHEET OF TENDER PURPOSE ONLY

Sl. No.	Date	Revised By	Checked By	Approved By
1	2016.04.20	[Signature]	[Signature]	[Signature]

DESIGNED BY: [Name]
 DRAWN BY: [Name]
 CHECKED BY: [Name]
 APPROVED BY: [Name]

Scale: 1:1

CMPDI
 CENTRAL POWER DESIGN INSTITUTE

Page: 1 of 2

DATE: 2016.04.20
 TIME: 10:30 AM
 PROJECT: [Name]

BHARAT COKING COAL LIMITED

(A Mini Ratna Company)

PRICE BID (PART- II)

BOQ (Bill of Quantities)

Name of work: Planning, Design, Engineering, Construction, Fabrication, Supply, Erection, Trial-run, Commissioning and Testing of Rapid Loading System on Existing Railway siding for 5.0 Mtpa capacity Patherdih Washery & comprising of all Civil, Structural, Electrical and Mechanical Works and all other accessories and facilities as required to make it complete in all respects, on turnkey basis.

NIT. No. BCCL/CMC/E-TENDER/RLS PATHERDIH /2020/ 250

Date: 28-07-2020

Price Bid:-The Price bid containing the Bill of Quantity (BOQ) is in .xls format (password protected). This will be downloaded by the bidder and he will quote the rates for all items on this Excel file. Thereafter the bidder will upload the same Excel file during bid submission in Cover-II.