The Tata Power Company Ltd	TATA POWER	*OPEN TENDER NOTIFICATION*
Tender Reference: ***CC27AAM026***		*Document Date:* ***1st Oct 2026***

The Tata Power Company Limited Invites Tender through E-Tender Two-Part Bidding Process from interested bidders for the following package: -

A. Summary of the tendered package:

Sr. No.	Description	Tender Reference no.	Bid Guarantee Fee / EMD (Rs.)	Tender Fee (Rs.)	Last Date and Time for bid submission
For the following package please send mail to Ms. Ayesha Abbas Mujawar (ayesha.mujawar@tatapower.com) with copy to Mr. Rameshkumar P N (pnramesh@tatapower.com).					
1.	Fire system work at Ramtekdi DSS, City Zone	CC27AAM026	1,00,000/-	2,000 /-	21st Oct

B. Procedure to Participate in Tender.

Following steps to be done before "Last date and time for Payment of Tender Participation Fee" as mentioned above

1. Non-Refundable Tender Fee, as indicated in table above, to be submitted in the form of

Direct deposit in the following bank account and submit the receipt along with a covering letter clearly indicating the Tender Reference number –

Beneficiary Name – The Tata Power Co. Ltd.

Bank Name – HDFC Bank Ltd.

Branch Name – Fort Branch, Mumbai

Address – Maneckji Wadia Building, Nanik Motwani Marg, Fort, Mumbai 400023.

Branch Code – 60

Bank & Branch Code – 400240015

Account No – 00600110000763

Account type – CC

IFSC Code – HDFC0000060

2. Eligible and Interested Bidders to submit duly signed and stamped letter on Bidder's letterhead indicating

Tender Enquiry number

Name of authorized person

Contact number

e-mail id

Details of submission of Tender Participation Fee

CONFIDENTIAL

Property of Tata Power – Not to be reproduced without prior written permission of Tata Power

E-mail with necessary attachment of 1 and 2 above to be send to ayesha.mujawar@tatapower.com with copy to pnramesh@tatapower.com before "Last date and time for Payment of Tender Participation Fee"

Interested bidders to submit Tender Participation Fee and Authorization Letter before Last date and time as indicated above after which link from Tata Power E-Tender system (Ariba) will be shared for further communication and bid submission.

Please note all future correspondence regarding the tender, bid submission, bid submission date extension, Pre-bid query etc. will happen only through Tata Power E-Tender system (Ariba).

No e-mail or verbal correspondence will be responded. All communication will be done strictly with the bidder who have done the above step to participate in the Tender.

Also it may be strictly noted that once date of "Last date and time for Payment of Tender Participation Fee" is lapsed no Bidder will be sent link from Tata Power E-Tender System (Ariba). Without this link vendor will not be able to participate in the tender. Any last moment request to participate in tender will not be entertained.

Any payment of Tender Participation Fee by Bidder who have not done the pre-requisite will not be refunded.

Also all future corrigendum's to the said tender will be informed on Tender section on website https://www.tatapower.com only.

******

CONFIDENTIAL

Property of Tata Power – Not to be reproduced without prior written permission of Tata Power

OPEN TENDER NOTIFICATION

FOR

CC27AAM026-Fire system work at Ramtekdi DSS, City Zone.

The Tata Power Company Limited (Tata Power)
Smart Center of Procurement Excellence,2nd Floor,
Sahar Receiving Station, Near Hotel Leela,
Sahar Airport Road, Andheri East, Mumbai-400059

CONFIDENTIAL

Property of Tata Power – Not to be reproduced without prior written permission of Tata Power

Section A : Tender Notice including Instruction to Bidders

1. Tender Details

1.1 Key Tender Specific Details

Reference Number	**CC27AAM026**
Description	**Fire system work at Ramtekdi DSS, City Zone**
Type of Tender	**Outline Agreement**
Estimated Period	**1 year**
Tender Fee	**Rs 2000/-**
Earnest Money Deposit (EMD)	**Rs 1,00,000/-** **Rs. One Lakh Only**
Price Basis	**Fixed Price**
Executive Handling this Tender*	Name: Ms. Ayesha Abbas Mujawar E-Mail ID: ayesha.mujawar@tatapower.com
Technical Query *	Name: Mr. Sangle Subhash E-mail id- subhash.sangle@tatapower.com

*You may contact the above personnel from Monday to Friday during office hours only.

CONFIDENTIAL

Property of Tata Power – Not to be reproduced without prior written permission of Tata Power

1.2 Calendar of Events

(a)	Payment of Tender Fee and Submission of letter nominating authorized person by Interested Bidder indicating their intent to Buy Tender	Till 7th Oct 2026
(b)	Access to Tender Documents through E-Tender system to authorized person of Interested Bidder	7th Oct 2026
(c)	Last Date of receipt of pre-bid queries, if any.	10th Oct 2026
(d)	Last Date of Posting Consolidated replies to all the pre-bid queries as received	15th Oct 2026
(e)	Last date and time of receipt of Bids	21st Oct 2026

Note:- * These date and time are as planned and tentative. In case of change the same shall be intimated to Authorized Person of Interested Bidder through E-Tender System.

Please note post submission of Bids relevant communication will be done with Authorized Person of Interested Bidder through E-Tender System

1.3 Mandatory documents required along with the Bid

1.3.1 Bid Guarantee Fee (EMD) of requisite value and validity. PLEASE NOTE THAT BID GUARANTEE ONLY IN FORM OF BANK GUARANTEE WILL BE ACCEPTED.

1.3.2 Requisite Documents to ascertain fulfilling of Technical and Commercial Pre-Qualification Requirement as detailed in Tender Enquiry.

1.3.3 Technical Submission including Drawings, Type Test details etc as detailed in Technical Specification.

1.3.4 Required Commercial Submission as detailed in Tender Document

1.3.5 Technical and Commercial Clarification and Deviations as per the format attached in the Tender Enquiry

1.3.6 Proper authorization letter to sign the tender and participate in Tata Power E-Tender system on the behalf of bidder.

1.3.7 **For vendor not registered with Tata Power, Duly filled Vendor Registration form with all supporting documents is mandatory to participate in the Tender**.

Please note that in absence of any of the above documents, the bid submitted by a bidder shall be liable for rejection.

Also please note that whenever editable format are shared it is requested that data be filled in relevant cells. No formatting or addition / deletion of rows / columns to be done. Wherever editable Excel submission are requested the file should be free from references, macros etc.

CONFIDENTIAL

Property of Tata Power – Not to be reproduced without prior written permission of Tata Power

Checklist of Document Submission

Stage of Tendering	Document	Type of Format	Mode of submission
Before last date of Pre-Bid Query	Query / Clarification / Deviation (QCD) Format. (F1) Technical and Commercial	Editable Excel Format	Through message in E-tender system
Bid Submission Envelope 1 (First Part)	**Earnest Money Deposit**	**Original Bank Guarantee**	**In Sealed Envelope**
Bid Submission Envelope 2 (Second Part)	**Documents to be uploaded in Ariba only.** In case of multiple files, a zipped folder can be attached for the same (size limit of 100MB per zipped file)		
To be submitted Under Tab 2.1 in Ariba	Duly filled PQR and supporting documents		
	Duly filled PQR format	Editable Excel Format	E-Tender System
	Backup documents for Technical and Commercial PQR	Signed and Scanned documents	E-Tender System
To be submitted under Tab 2.2 in Ariba	Technical Submission and Supporting Documents		
	Duly filled Unpriced Bid Format. Signed copy of Technical Specifications indicating your acceptance of the same	Signed and scanned copy of document	E-Tender System
To be submitted under Tab 2.3 in Ariba	Commercial Submission and supporting document		

CONFIDENTIAL

Property of Tata Power – Not to be reproduced without prior written permission of Tata Power

	Letter of Undertaking (FOR VENDORS NOT REGISTERED WITH TATA POWER)	Scanned Copy of letter of undertaking duly filled, stamped and signed	E-Tender System
	E-auction Undertaking form	Scanned Copy of letter of undertaking duly filled, stamped and signed	E-Tender System
Bid Submission Envelope 3 (Third Part)	**Duly filled Priced Bid Format**	Hard copy in original duly signed and stamped	**Sealed Envelope**
	Duly filled Priced Bid Format	To be entered in E-Tender System	E-Tender System

1.4 Deviation from Tender

Normally, the deviations to tender terms are not admissible and the bids with deviation are liable for rejection. Hence, the bidders are advised to refrain from taking any deviations on this Tender. Still in case of any deviations, all such deviations shall be set out by the Bidders, clause by clause in the Query / Clarification / Deviation (QCD) Format. Deviations have to be mandatorily submitted in editable Excel sheet.

Technical or Commercial Deviation should be mentioned in Deviation Format only. Deviation in any other document or Format will not be considered.

1.5 Right of Acceptance/Rejection

1.5.1 Bids are liable for rejection in absence of following:-
1.5.2 Mandatory Documents as listed in 1.3 above
1.5.3 Price Bid as per the Price Schedule mentioned in Tender Document
1.5.4 Receipt of Bid and Response to queries within the due date and time

Tata Power reserves the right to accept/reject any or all the bids without assigning any reason thereof.

CONFIDENTIAL

Property of Tata Power – Not to be reproduced without prior written permission of Tata Power

1.6 Qualification Criteria

TECHNICAL REQUIREMENT:

1. Bidder should have minimum 3 years of experience in the field of firefighting system and fabrication works. Bidders to Attach Certificates / related supporting documents
2. Bidder should provide minimum two references for having successfully rendered Civil and Fire system fabrication works having contract value of Rs. 40 Lakhs or above in last two years. Bidders to Attach Certificate of Experience and Satisfactory Completion of work awarded from concerned Establishments / Companies.
3. Bidder should furnish List of Clients for whom they have done firefighting system and fabrication works during the last three financial years i.e., FY 2023 -24, FY 2024 -25, and FY 2025-26 as per nature of contract. Bidders to Attach Certificates from concerned.
4. Bidder / Tenderer should have ISO 9001 / ISO 14001 / ISO 45001 certification or must give an undertaking for its willingness to obtain the same within 2 months of qualification for the work.
5. They should follow all TPC safety standards while execution of work.

FINANCIAL REQUIREMENT:

1. Bidder / Tenderer should have minimum Average Annual Turn-over of Rs. 2 Crores (Indian Rupees Two Crores) during the last three financial years. Bidders to Attach Certificate from Chartered Accountant in this regard) with P&L or balance sheet with UDIN number.

1.7 Pre-Bid Queries

Technical or Commercial Pre-Bid Queries if any has to be sent through message in E-Tender System. Pre-Bid Query has to be sent only in the Query / Clarification / Deviation (QCD) Format. Pre-Bid Queries sent in any other format or send through any other communication channel will not be accepted and answered. Pre-Bid Query have to be sent in the stipulated timeline as defined in the Tender Document. No Pre-Bid Query will be accepted after the due time and date as specified as "Last Date of receipt of pre-bid queries, if any"

1.8 Marketing Integrity

We have a fair and competitive marketplace. The rules for bidders are outlined in the General Condition of Contracts and other parts of Tender Documents. Bidders must agree to these rules prior to participating. In addition to other remedies available, Tata Power reserves the right to exclude a bidder from participating in future markets due to the bidder's violation of any of the rules or obligations contained in the General Condition of Contracts or other part of the Tender Documents. A bidder who violates the market place rules or engages in behavior that disrupts the fair execution of the marketplace, may result in restriction of a bidder from further participation in the marketplace for

CONFIDENTIAL

Property of Tata Power – Not to be reproduced without prior written permission of Tata Power

a length of time, depending upon the seriousness of the violation. Examples of violations include, but are not limited to:

- Failure to honor prices submitted to the marketplace
- Breach of terms as published in TENDER
- Submit irrelevant documents or frequently cases of missing documents as part of compliance to Qualifying, Technical or Commercial Requirements causing unnecessary delay in Tender Evaluation

1.9 Supplier Confidentiality

All information contained in this tender is confidential and shall not be disclosed, published or advertised in any manner without written authorization from Tata Power. This includes all bidding information submitted to Tata Power. All tender documents remain the property of Tata Power and all suppliers are required to return these documents to Tata Power upon request. Suppliers who do not honor these confidentiality provisions will be excluded from participating in future bidding events.

1.10 Payment Terms

100% payment shall be made within **60 days** (45 days for MSME) from the receipt and acceptance of the material at the Consignee Stores/Site/Location as per the Contractual Terms and Conditions.

2. Evaluation Criteria

- The bids will be evaluated technically on the compliance to tender terms and conditions.
- The bids will be evaluated commercially on the overall all-inclusive lowest cost for the complete tender BOQ / each line item as calculated in Schedule of Items. Tata Power however, reserves right to split the order line item wise and/or quantity wise among more than one Bidder. Hence all bidders are advised to quote their most competitive rates against each line item.
- Bidder has to mandatorily quote against each item of Schedule of Items. Failing to do so, Tata Power may reject the bids.

NOTE: In case of a new bidder not registered with Tata Power, factory inspection and evaluation shall be carried out to ascertain bidder's manufacturing capability and quality procedures. However Tata Power reserves the right to carry out factory inspection and evaluation for any bidder prior to technical qualification. In case a bidder is found as Disqualified in the factory evaluation, their bid shall not be evaluated any further and shall be summarily rejected. The decision of Tata Power shall be final and binding on the bidder in this regard.

2.1 Price Variation (PV) Clause:

Not Applicable, Prices are fixed for entire OLA duration.

3.1 Bid Submission

Bidders are requested to submit their offer in line with this Tender document. Bids shall be submitted in 3 (three) parts:

CONFIDENTIAL

FIRST PART: "EMD – BANK GUARANTEE" of Value detailed in 1.1 valid for 180 days from the due date of bid submission in the form of Bank Guarantee favoring 'The Tata Power Company Limited'. The EMD has to be strictly in the format as mentioned in Tender Document, failing which it shall not be accepted by Tata Power and the bid as submitted shall be liable for rejection.

Note : BG of 180 days and further claim period of 180 days is needed. In case the same cannot be issued by your bank then BG valid for 365 days can be provided.

Note : At times bidders have sought Tata Power bank details which is needed by them to make BG. Hence the same is reproduced below. These details are only provided to facilitate making of BG if needed:

Tata Power's Bank Details for submitting EMD BG:

Bank Name & Address – HDFC Bank, Maneckji Wadia Building, Nanik Motwani Marg, Fort, Mumbai 400 023.
A/c no. - 00600110000763
IFSC Code – HDFC0000060

The hard copy of EMD in a sealed envelope should be sent on address mentioned in Tender document.

First Part has to be submitted in Sealed Envelope.

SECOND PART: "TECHNICAL / UN-PRICED COMMERCIAL BID" shall contain the following documents:

a) Documentary evidence in support of Technical, Commercial qualifying criteria
b) Technical literature/GTP/Type test report/Details of Qualified Manpower Available/ Testing Facility available etc. *(complete in all respect as desired and detailed in Technical Specification and Technical Requirement Section)*
c) Duly filled Technical and Commercial Deviation Sheets
d) Duly filled formats like Authorization affidavit form
e) *Unpriced Commercial Bid*

The technical / un-priced commercial bid shall be properly indexed and is to be submitted in Soft Copy though E-Tender system of Tata Power. Hard Copy of Technical Bids need not be submitted.

Second Part has to be submitted through E-Tender System Only

THIRD PART: "PRICE BID" shall contain only the price details and strictly in Price Bid format along with explicit break up of basic prices and applicable GST. Basic price should include packaging forwarding, freight, transit insurance and any other cost envisaged by the bidder.

Third part has to be submitted through E-Tender System (ARIBA) only.

FOR BIDS INVITED THROUGH E-TENDER SYSTEM (TECHNICAL AND UN-PRICED COMMERCIAL BID) :

In response to advertisement Bidder has to provide details of person authorized to Bid on behalf of the Bidder. An e-mail will be generated by E-Tender System and the authorized person can download the Tender Documents from the system.
SECOND and THIRD PART of the Bid have to be submitted in E-Tender System.

CONFIDENTIAL

Property of Tata Power – Not to be reproduced without prior written permission of Tata Power

Bidders have to mandatorily submit SECOND PART (Technical and Un-priced commercial Bid) only through E-Tender system of Tata Power. Bids submitted through any other form/ route shall not be admissible.

EMD
"Please mention Tender Reference No"

Please mention our Tender Reference No on the Tender and drop the same in our Tender Box located at The Tata Power Company Limited, Smart Center of Procurement Excellence,2nd Floor, Sahar Receiving Station, Near Hotel Leela, Sahar Airport Road, Andheri East, Mumbai-400059

Bids submitted by Email/Telex/Telegram /Fax will be rejected. No request from any Bidder to Tata Power to collect the proposals from Courier/Airlines/Cargo Agents etc. shall be entertained.

SIGNING OF BID DOCUMENTS:

The bid must contain the name, residence and place of business of the person or persons making the bid and must be signed and sealed by the Bidder with his usual signature. The names of all persons signing should also be typed or printed below the signature.

The Bid being submitted must be signed by a person holding a Power of Attorney authorizing him to do so, certified copies of which shall be enclosed.

The Bid submitted on behalf of companies registered with the Indian Companies Act, for the time being in force, shall be signed by persons duly authorized to submit the Bid on behalf of the Company and shall be accompanied by certified true copies of the resolutions, extracts of Articles of Association, special or general Power of Attorney etc. to show clearly the title, authority and designation of persons signing the Bid on behalf of the Company. Satisfactory evidence of authority of the person signing on behalf of the Bidder shall be furnished with the bid.

A bid by a person who affixes to his signature the word 'President', 'Managing Director', 'Secretary', 'Agent' or other designation without disclosing his principal will be rejected.

The Bidder's name stated on the Proposal shall be the exact legal name of the firm.

3.2 Contact Information

Communication Details: Detailed in 1.1

3.3 Bid Prices

Bidders shall quote for the entire Scope of Supply/ work with a break up of prices for individual items and Taxes & duties. The bidder shall complete the appropriate Price Schedules included herein, stating the Unit Price for each item & total price with taxes, duties & freight up to destination at various sites of Tata Power. The all-inclusive prices offered shall be inclusive of all costs as well as Duties, Taxes and Levies paid or payable during the execution of the supply work, breakup of price constituents.

The quantity break up shown else-where other than Price Schedule is tentative. The bidder shall ascertain himself regarding material required for completeness of the entire work. Any items not indicated in the price schedule but which are required to complete the job as per the Technical Specifications/ Scope of Work/ SLA mentioned in the tender, shall be deemed to be included in prices quoted.

CONFIDENTIAL

Property of Tata Power – Not to be reproduced without prior written permission of Tata Power

3.4 Bid Currencies

Prices shall be quoted in Indian Rupees Only. It also may be noted that the denomination of Purchase Order / Outline Agreement / Rate Contract and associated Payment to Successful Bidder shall also be in Indian Rupees Only. In case Bidder intends to import any equipment, part etc and supply to Tata Power then all liability and costs related to import will rest with the Bidder. All statutory compliances, payments, expenditure etc related to importing of equipment will be responsibility of the bidder.

3.5 Period of Validity of Bids

Bids shall remain valid for 180 days from the due date of submission of the bid.

Notwithstanding clause above, Tata Power may solicit the Bidder's consent to an extension of the Period of Bid Validity. The request and responses thereto shall be made in writing.

3.6 Alternative Bids

Bidders shall submit Bids, which comply with the Bidding documents. Alternative bids will not be considered. The attention of Bidders is drawn to the provisions regarding the rejection of Bids in the terms and conditions, which are not substantially responsive to the requirements of the bidding documents.

3.7 Modifications and Withdrawal of Bids

The bidder is not allowed to modify or withdraw its bid after the Bid's submission. The EMD as submitted along with the bid shall be liable for forfeiture in such event.

3.8 Earnest Money Deposit (EMD)

The bidder shall furnish, as part of its bid, an EMD amounting as specified in the tender. The EMD is required to protect the Tata Power against the risk of bidder's conduct which would warrant forfeiture.
The EMD shall be in following form:

- Bank Guarantee valid for 180 days after due date of submission.

The EMD shall be forfeited in case of:

a) The bidder withdraws its bid during the period of specified bid validity.

Or

b) In case of a successful bidder, if the Bidder, within 15 days, does not
i) accept the purchase order, or
ii) furnish the required Contract Performance Bank Guarantee (CPBG)

Original Bank Guarantee submitted as EMD shall be returned only after completion of award process for unsuccessful bidders and issue of Contract Performance Bank Guarantee (CPBG) for successful bidder.

4. Bid Opening & Evaluation process

4.1 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

CONFIDENTIAL

not officially concerned with such process. Any effort by a Bidder to influence Tata Powers processing of Bids or award decisions may result in the rejection of the Bidder's Bid.

4.2 Technical Bid Opening

Bids will be opened at Corporate Office of Tata Power as per our standard Process. The bids shall be opened internally by Tata Power. Technical bid must not contain any cost information whatsoever.

First the envelope marked "EMD" will be opened. Bids without EMD of required amount/ validity in prescribed format, shall be rejected.

Next, the technical bid of the bidders who have furnished the requisite EMD will be opened in E-Tender system.

4.3 Preliminary Examination of Bids/Responsiveness

Tata Power will examine the Bids to determine whether they are complete, whether any computational errors have been made, whether required sureties have been furnished, whether the documents have been properly signed, and whether the Bids are generally in order. Tata Power may ask for submission of original documents in order to verify the documents submitted in support of qualification criteria.

Prior to the detailed evaluation, Tata Power will determine the substantial responsiveness of each Bid to the Bidding Documents including production capability and acceptable quality of the Goods offered. A substantially responsive Bid is one, which conforms to all the terms and conditions of the Bidding Documents without material deviation.

Bid determined as not substantially responsive will be rejected by the Tata Power and/or the Tata Power and may not subsequently be made responsive by the Bidder by correction of the non-conformity.

4.4 Techno Commercial Clarifications

Bidders need to ensure that the bids submitted by them are complete in all respects. To assist in the examination, evaluation and comparison of Bids, Tata Power may, at its discretion, ask the Bidder for a clarification on its Bid for any deviations with respect to the Tata Power specifications and attempt will be made to bring all bids on a common footing. All responses to requests for clarification shall be in writing and no change in the price or substance of the Bid shall be sought, offered or permitted owing to any clarifications sought by Tata Power.

4.5 Price Bid Opening

The EMD of the bidder withdrawing or substantially altering his offer at any stage after the technical bid opening will be forfeited at the sole discretion of Tata Power without any further correspondence in this regard.

Arithmetical errors will be rectified on the following basis: If there is a discrepancy between the unit price and the total price per item that is obtained by multiplying the unit price and quantity, the unit price shall prevail and the total price per item will be corrected. If there is a discrepancy between the Total Amount and the sum of the total price per item, the sum of the total price per item shall prevail and the Total Amount will be corrected.

4.6 Reverse Auction and Price Matching Option

CONFIDENTIAL

Property of Tata Power – Not to be reproduced without prior written permission of Tata Power

Tata Power reserves the right to go for Reverse Auction (RA) for price negotiation and discover the most competitive price on ARIBA portal, Tata Power's official e-tendering platform. This will be decided after techno-commercial evaluation of the bids. Bidders need to give their acceptance with the offer for participation in RA. Non-acceptance to participate in RA may result in non-consideration of their bids, in case Tata Power decides to go for RA.

Only those bidders who are techno-commercially qualified shall be eligible to participate further in RA process. However, the original H1 bidder (whose price bid is the highest post techno-commercial evaluation) shall not be allowed to participate in further RA process provided minimum three techno-commercially qualified bids are available.

For case where more than one bidders have to be awarded (including Rate Contract / Outline Agreement) Price Matching Option will be exercised. Volume of job allocated to original competitive bidder will be more than bidder who is chosen through Price Matching Option. Tata Power decision regarding work sharing shall be final and no explanation OR clarification shall be given regarding the same.

5.0 Award Decision

Tata Power will award the contract to the successful bidder whose bid has been determined to be the lowest-evaluated responsive bid as per the Evaluation Criterion mentioned at Clause 2.0. The Cost for the said calculation shall be taken as the all-inclusive cost quoted by bidder in Priced Bid Format subject to any corrections required in line with Clause 4.3 above. The decision to place purchase order/Outline Agreement/ Rate Contact solely depends on Tata Power on the cost competitiveness across multiple lots, quality, delivery and bidder's capacity, in addition to other factors that Tata Power may deem relevant.

Tata Power reserves all the rights to award the contract to one or more bidders so as to meet the delivery requirement or nullify the award decision without assigning any reason thereof.

In case any supplier is found unsatisfactory during the delivery process, the award will be cancelled and Tata Power reserves the right to award other suppliers who are found fit.

5.1 Rate Contract / Outline Agreement

Rate Contract / Outline Agreement does not guarantee any assured business volume in Rupees or Quantity. Quantities are only indicative and specified for the purpose of readiness as per the request from Purchaser. Supplies shall be only against Firm Purchase Orders placed as per the agreed terms and conditions of Rate Contract / Outline Agreement. Purchaser shall be entitled at its discretion to place firm order for such supplies on "As and When Required Basis" without minimum take-off guarantee.
Rate Contract / Outline Agreement will have list of Items with Unit Rate and applicable Taxes and Duties. There will be a cap on value for which order which can be placed against the Rate Contract / Outline Agreement. Actual quantity ordered for each line item may differ significantly from the tentative quantity indicated in the Tender Document. One / few / all items of Rate Contract / Outline Agreement can be ordered till the Cap Value is reached.

CONFIDENTIAL

Property of Tata Power – Not to be reproduced without prior written permission of Tata Power

6.0 Order of Preference/Contradiction:

In case of contradiction in any part of various documents in tender, following shall prevail in order of preference:

1. Outline Agreement/Purchase Order (with Commercial conditions)
2. Special Terms and conditions (if applicable)
3. General Terms and conditions
4. Technical Specifications

In case there is a discrepancy in the BOQ mentioned in tender (to the extent modified through subsequent Corrigendum, if any) and the bid submitted by any bidder, the description as mentioned in the tender (to the extent modified through subsequent Corrigendum, if any) shall prevail.

7.0 Ethics

Tata Power is an ethical organization and as a policy Tata Power lays emphasis on ethical practices across its entire domain. Bidder should ensure that they should abide by all the ethical norms and in no form either directly or indirectly be involved in unethical practice.

Tata Power work practices are governed by the Tata Code of Conduct. Bidder is request to refer Tata Code of Conduct Clause in General Terms and Conditions.

8.0 General Condition of Contract and Special Condition of Contracts

Any condition not mentioned above shall be applicable as per General Terms and Conditions and Special Condition of Contracts attached along with this tender.

---XXX---

CONFIDENTIAL

Property of Tata Power – Not to be reproduced without prior written permission of Tata Power

Annexure 1

Schedule Of Items

Sr. no.	Material / Service Short Text (as per SAP)	Duration	UoM	Unit Rate (Basic)	Total with GST
1	Fire system work at Ramtekdi DSS, City Zone	1	Year		

(All Values to be entered in Indian Rs.)

CONFIDENTIAL

Property of Tata Power – Not to be reproduced without prior written permission of Tata Power

AGREED TERMS & CONDITIONS (ATC)- Indigenous Service

Bidder's Name: M/s. _____

RFQ ref. No. CC27AAM026
Enquiry Description: Fire system work at Ramtekdi DSS, City Zone

Bidder's Offer Ref.: *<pls mention your offer reference no here>*

1. SUBMISSION OF THIS DOCUMENT DULY SIGNED, SHALL CONSTRUE THAT ALL THE CLAUSES OF AGREED TERMS AND CONDITIONS HAVE BEEN ACCEPTED BY YOU. PURCHASE ORDER, IF ANY, SHALL BE GOVERNED BY THE CONFIRMATION PROVIDED HERE.

S. No.	Description	BIDDER'S RESPONSE
A	**TECHNICAL**	
1	Acceptance of technical specifications / scope of work including General/Technical notes as per Tender specification **In case of deviation, confirm that the same has been furnished separately.**	
2	Confirm data sheets duly filled in have been submitted, wherever required as requested in Technical specification/ Scope of work	
B	**COMMERCIAL**	
3	**Bid Validity** Confirm Bid Validity 180 days from date of bid submission.	
4	**Firm price:** Negotiated prices shall remain firm for a particular year.	
5	**Delivery Terms** Confirm delivery terms FOT/FOR for any spares/consumables	
6	**Packing & Forwarding** Confirm that Packing & Forwarding charges including Special Packaging Requirement (if applicable) are included in base price	
7	**Freight Charges** Confirm that Freight charges are included in base price	
8	**Taxes and duties:** GST: __% HSN/ SAC Code: Any other tax as applicable:	
9	**Price Reduction / LD / SLA**: Confirm that Bidder agrees to the LD charges as specified in GCC file and agrees to SLA document	
10	**Completion/Delivery Period:** Confirm as per RFQ requirements Mention the delivery timelines from the date of order	
11	**Payment Terms Acceptance:** Confirm acceptance to the Payment terms as specified in GCC.	
12	**Warranty / Latent Defect Liability Period:** Defect liability period will be one year.	
13	**Contract Performance Bank Guarantee**: Confirm acceptance to Submission of CPBG as per GCC	
14	**Testing and Inspection charges (if applicable):** Confirm the quoted are Inclusive of all testing and inspection charges as per Tender specification	

S. No.	Description	BIDDER'S RESPONSE
15	**Compliance to other terms & conditions** Acceptance of all other terms & conditions as forming the Part of the RFQ/ Tender document and communicated vide subsequent addendum(s) if any: **In case of deviation, confirm that the same has been furnished separately.**	

*Bidders / Vendor shall note that in case of any contradiction between the Agreed Terms and Conditions (ATC); and the Bidders offer, the ATC shall prevail.

Bidder's Authorised Signatory and stamp:

Name:

THE TATA POWER COMPANY LIMITED

PAREL DSS PROJECT

TECHNICAL SPECIFICATION
FOR

FIRE DETECTION AND PROTECTION SYSTEM FOR PAREL DSS

SPECIFICATION NO – GE00528-00-V001-M-SP-001

Tata Power

Generation Engineering

Rev No	Date	Prepared By		Reviewed By		Approved By	
R0	23/04/2026	Name		Name		Name	
		Signature		Signature		Signature	

Contents

COVER PAGE		
SECTION NO	**DESCRIPTION**	**No. of Pages**
A	**SPECIFICATIONS**	
1.0	INTRODUCTION	
2.0	SCOPE OF WORK	
3.0	BIDDER'S QUALIFICATION REQUIREMENTS	
4.0	TERMINAL POINTS	
5.0	EXCLUSIONS	
6.0	PROJECT SCHEDULE / MILE STONES	
7.0	SUBMISSIONS BY BIDDERS	
8.0	PROJECT INFORMATION	
9.0	Specific Project Requirement	
10.0	EQUIPMENT TECHNICAL SPECIFICATIONS	
11.0	PERFORMANCE & GUARANTEE TESTS	
B	Section B:- Technical Specification	
	Chapter No 1 Deluge valve assembly and its Accessories	
	Chapter No 2 Fire Detection and Alarm system	
	Chapter No 3 LP Piping specification	
	Chapter No 4 Hydrant system	
	Chapter No 5 Under Ground Piping	
	Chapter No 6 Specification for pump sets	
	Chapter No 7 Sprinkler System	
	Chapter No 8 Medium Velocity Water Spray system	
	Chapter No 9 High Velocity water spray system	
	Chapter No 10 LT motors	
	Chapter No 11 LV switchgear	
	Chapter No 12 Painting	
	Chapter No 13 Standard Quality plan	
	Chapter No 14 Quality Assurance requirements	
	Chapter no 15 Technical specification for diesel Engine	
C	**SCHEDULES**	

C1	Schedule Of Quantities and Prices (including services)	
C2	Time Schedule for the project	
C3	Schedule Of Deviations From Technical Specifications	
C4	Schedule Of Deviations from General & Special conditions of contract	
C5	Schedule of Drawings/ Document submission	
C6	Schedule Of Mandatory Spares	
C7	Schedule of special erection, maintenance tools & tackles	
C8	Schedule of places of tests & inspection	
C9	Schedule Of Recommended Spares (to be listed by bidders)	
D	**Drawings**	
1	P&ID Diagram of Fire protection System	
2	Plot plan	
3	Building Plan Elevation View	
4	Sub vendor list	
5	Typical Civil detail for Pipe Support and road crossing of Fire pipe	

1.0 INTRODUCTION

1.1 This specification covers the requirements of design, manufacture, inspection and testing at manufacturers works, supply, transportation to site, receipt, unloading and storage of materials to site, erection, testing and commissioning of fire Protection and Detection system for 110 kV GIS project at BADALAPUR receiving station.

2.0 SCOPE OF WORK

2.1 Design, Engineering, Manufacturing, Inspection and testing, insurance, transportation to site, unloading and handling at site, storage, erection, supervision, pre commissioning, completion of facilities, conducting performance guarantee test and handing over the complete system to Owner as per specification for the followings

2.1.1 One no (01) Main electrical motor driven vertical turbine type pump having capacity 171 M^3/Hr @ 70 MWC for hydrant system.

2.1.2 One no (01) Main electrical motor driven vertical turbine type pump having capacity 171 M^3/Hr @ 70 MWC for spray / sprinkler system.

2.1.3 One no (01) Stand by Diesel engine driven vertical turbine type pump having capacity 171 M^3/Hr @ 70 MWC MWC.

2.1.4 Two no (02) vertical turbine type Jockey pump having capacity 10.8 M^3 / Hr @ 70 MWC.

2.1.5 One no (01) Horizontal split casing Booster pump having capacity 900 LPM @ 35 MWC.

2.1.6 Design, supply, installation, testing & commissioning of external Fire Hydrant system for entire receiving station as per latest plot plan and as per specification.

2.1.7 Design, supply, installation, testing & commissioning of Internal Fire Hydrant system for entire receiving station as per latest plot plan and as per specification.

2.1.8 A separate spray / sprinkler header shall be laid for spray and sprinkler system.

2.1.9 High Velocity Water Spray system for 4 nos 20 MVA Transformer as per specification.

2.1.10 Medium Velocity Water Spray system for cable gallery in station building as shown on the plot plan as per specification

2.1.11 Sprinkler system for Fire water pump house including fuel tank as per specification.

2.1.12 Sprinkler system for ground floor, Mezzanine floor & first floor as per specification.

2.1.13 Design supply, installation testing and commissioning of all instruments as per P&ID provided in section D.

2.1.14 Fire alarm & Detection system for each floor of station building, fire water pump house, outdoor switchyard and transformer yard as per specification.

2.1.15 Providing Fire Extinguisher for complete Receiving station shall be provided as per below table for station building.

2.1.16 Fire Extinguisher shall also to be provided at switchyard / Transformer, fire pump room, external area, security cabin as per TAC and NFPA

2.1.17 Two sets of B.A. (Breathing suits) shall be provided at the entrance of the cable basement.

2.1.18 Appropriate illuminated signages for escape routes shall be provided at prominent location as per approved drawing.

2.1.19 Design, supply, Installation, testing & commissioning of Fire retardant paint for all power and control cable as per specification.

2.1.20 Design, supply, Installation Testing and commissioning of fire stop for all cable entry and exist as per specification

2.1.21 Supply of mandatory spares as listed in Section C9 in the project specification is in bidder's scope.

2.1.22 Contractor shall responsible for getting Final No Objection certificate (NOC) from local fire authority. bidder will also extend all necessary help regarding performance testing of the complete fire fighting system installed by him and carry out modification in the system as per the instruction of Fire officer / Tata power (if any) to meet the requirement of local fire authority at no extra cost to the purchaser.

2.1.23 Providing Upfront Performance Guarantee of the complete Fire Fighting & Fire Alarm system installed by bidder for 24 months from the date of handover of complete system to Tata Power.

2.1.24 Hydrostatic testing, flushing and painting, commissioning, performance testing of complete fire fighting system as per specification.

2.1.25 Any other system / equipments not specifically excluded from the scope of the vendor and required for the successful completion of the system as per specification shall be in bidder's scope. Vendor shall refer all sections, drawings, enclosures attached with this specification, applicable standards for Hydrant, Sprinkler, HVWS, MVWS, Fire Alarm system & Fire extinguisher and follow all codes, standards, Guidelines as applicable to complete the fire protection system for Parel DSS project and handover the system to Owner.

3.0 BIDDER'S QUALIFICATION REQUIREMENTS

3.1 Bidder must have carried out min 2 nos. of similar kind of job in last 2 year for power plant, receiving station, refinery and steel plant of value more than 100 Lakhs each. Scope of such references should include design, supply installation, commissioning, and performance guarantee of the complete system including Fire Hydrant, HVWS, MVWS, Sprinkler, Fire Alarm & Detection system for Industrial unit.

3.2 Bidder shall be approved Fire fighting contractor of BMC.

4.0 TERMINAL POINTS

4.1 Civil:- Pump Foundation onwards

4.2 Electrical: - Power source for MCC will be available in the fire water pump house.

5.0 EXCLUSIONS

5.1 Construction of Fire water tank, Pump House and Pump Foundation.

6.0 PROJECT SCHEDULE / MILESTONES

6.1 Project schedule shall match overall project schedule of the project.

6.2 Bidder shall submit with the bid, a detailed Project Schedule covering the following based on the milestones tabulated below:

a. Start of 'Engineering'
b. Completion of 'Engineering'
c. Commencement of 'Manufacturing'/Manufacturing process
d. Commencement of Supply
e. Commencement of Supervision of erection, testing and commissioning

Project schedule given in PIM

7.0 SUBMISSIONS BY BIDDERS

7.1 Bidder shall submit the following Data sheets / information along with the Technical Bid.

a) All documents listed under technical specification listed in section B shall be submitted with bid.
b) Dully filled in Schedules, listed in section 'C'.
c) Quality Assurance Plan (QAP), Manufacturing Quality Plan (MQP)
d) Inspection Categorization Plan (ICP)
e) General Arrangement Drawings for equipment offered
f) Confirmation on technical support of the equipment for next 25 years.

7.2 Data to be submit by bidder for Tata Power approval after award of contract.

a) Bidder is responsible for submitting all the documents listed in this specification and get approval from Tata Power before starting manufacturing.
b) Bidder to submit quality assurance plan of each equipment for Tata Power approval
c) Bidder to submit performance test procedure of complete fire fighting system for Tata Power approval.
d) Bidder to submit Operation and maintenance manual (5 copies)

Note 1:- Bidder will submit all the drawings and documents in Tata Power approved format.

Note: - 2 Bidder to submit .pdf & native file of each revision of all documents.

8.0 PROJECT INFORMATION

8.1 Please refer Project Information provided in section D with bid documents.

8.2 Bidder to note that all equipments supplied under this specification shall comply all conditions/parameter mentioned in the project information.

9.0 Specific Requirement of Project.

9.1 Sizes of pump (flow and Head), size of the pipe, valves etc are the minimum requirement of this project. Bidder to analyze the capacity given in the specification and confirm that same meets project specification and CFO requirement.

9.2 Sprinkler system shall be provided for common area, common area means the area such lift lobby, office area, canteen, recreation room and all those room where energized equipment are not located or stored and sprinkler system is required as per applicable standards.

9.3 Two separate ring shall be laid. One is dedicated for fire hydrant system which cater requirement of external and internal fire hydrant and other is for dedicated to spray and sprinkler system which will cater requirement of sprinkler, HVWS & MVWS system.

9.4 All civil work including pipe pedestal support, deluge cabinet support, underground piping, excavation, wall cutting, floor cutting, grouting etc is in scope of bidder.

9.5 Pipe will run above ground or underground as instructed by site in charge and site clearance. Bidder to consider both the option to the extent possible for entire plot plan.

9.6 If pipe is laid above ground, it shall be laid on the pipe pedestal support. Minimum size of the pipe pedestal support is illustrated in section D.

9.7 If pipe is laid underground. Same shall be as per Underground pipe as per specification provided in section B for underground piping.

9.8 Test which is to be carried out on various equipment shall be as per Approved QAP.

9.9 Main fire Alarm panel shall be interfaced with SCADA through soft communication all necessary software, hardware parts shall be supplied by bidder including termination and Programming at MFAP end.

9.10 Bidder to use factory assemble deluge cabinet with butterfly valve at upstream, downstream and bypass line instead of deluge valve as specified in chapter no 1 of section B. All other requirement will be as per chapter no 1 of section B.

9.11 One no of isolation valve with Y type strainer shall be provided for every deluge cabinet at tapping from the main header.

9.12 Cables in cable trench shall be protected with separate deluge valve through MVWS system. There shall be separate deluge valve which is to be provided for MVWS system of cable basement and cable tunnel.

9.13 Minimum 6 Nos of external hydrant shall be provided.

9.14 Two nos of fire brigade inlet connection shall be provided one for hydrant system and another for sprinkler system.

9.15 Breaching connection shall also to be provide for tank refilling.

9.16 Linear heat sensing cable shall also to be provided for each cable tray at false flooring and above false ceiling area for detection purpose.

9.17 Cable in cable trenches shall also to be provided with fire retardant paint as per applicable codes. The fire paint shall be intumescent type as per IEC 60332 and tested as per IEC 332 part 3 standard for reduced spread of flame. Fire Paint shall be tested as per FM standard.

9.18 Fire Stop shall be provided at every cable entry & exit (power & control cable) in wall & in change in floor level. Fire stop material shall be mineral wool board system as per BS 476-20 pr EN 1366-3 & FM approved for 2 hours.

9.19 Bidder to follow make list provided in section D and follow all the make. If any equipment is missing in the list then bidder shall seek approval for the make proposed by bidder.

9.20 The term “Authority Having Jurisdiction” (AHJ) in NFPA is TATA Power.

9.21 Bidder is responsible for getting Final No Objection certificate (NOC) from local fire authority (BMC).

9.22 Bidder shall conduct performance testing of the complete fire fighting and Detection system installed by him and carry out modification in the fire fighting system as per the instruction of Fire officer / Tata power (if any) to meet the requirement of local fire authority to no extra cost to the purchaser.

9.23 For any discrepancies between specification, codes, Guidelines, statutory requirement etc the more stringent as per interpretation of the purchaser shall apply. However incase such discrepancies are noticed by bidder, same shall bring to notice of Tata Power and obtain clarification for the same.

9.24 Confirmation on technical support of the offered equipment for next 25 years.

10.0 EQUIPMENT TECHNICAL SPECIFICATIONS

10.1 Bidder to refer section B of this project specification for technical requirements of the system, equipments covered under fire protection and detection system.

10.2 Any item missing in the Section B, bidder to submit Data sheet of that equipment and get approval for the same before proceeding further.

11.0 PERFORMANCE AND GUARANTEE TESTS

11.1 Performance guarantee test of complete system shall be carried out as per specification and applicable NFPA standard.

11.2 Bidder shall responsible for the performance guarantee of installed system for 24 months from date of handover of system to Tata Power.

Section B

Technical Requirement of Fire Protection and Detection System

Chapter No 1

Standard Specification for Deluge Valve and Accessories.

ENGG/ P&L/STD-SPEC/ 001

THE TATA POWER COMPANY LIMITED

STANDARD

TECHNICAL SPECIFICATION

FOR

Deluge Valve and Accessories.

(DOCUMENT NO - ENGG/ P&L/STD-SPEC/ 001)

Tata Power

Generation Engineering

R2	14/5/24	Revised and issued for use	J Shinde	D Das	N Mishra
R1	16/1/2022	Revised and issued for use	J Shinde	N Mishra	R Gadre
R0	21/3/2014	Issued for Info or Use	JSS	RSG	AJ
Rev. No	**Date**	**Description**	**Prepared By**	**Checked By**	**Approved By**

WorkflowCompleted Printed By: AMAN GUPTA - 31/Jul/2025 - A

ENGG//P&L/ STD- SPEC /001 Rev: R1 Date: 16/1/2022	STANDARD SPECIFICATION Deluge Valve and Accessories.	Section: B

1.0 Scope

1.1 This specification covers Standard requirement of Deluge valve and its accessories.

2.0 Codes and Standards

2.1 All equipment, system and services covered under this specification shall comply with all currently applicable statutes, regulations, and safety codes. Nothing in this specification shall be construed to relieve the BIDDER of his responsibility

2.2 In the event of any conflict between the codes and the standards referred to elsewhere in the specification and the requirements of this specification, more stringent of the two shall govern.

2.3 Following are some of the important codes and standards relevant to this specification.

NFPA-13	Standard for installation of Sprinkler System
NFPA-15	Standard for Water Spray fixed system for the fire protection system
NFPA-25	Standard for the Inspection, Testing, and Maintenance of. Water-Based Fire Protection Systems

3.0 Deluge Valve Design requirement

3.1 Deluge valve and its trim shall have UL listed.

3.2 Design Pressure of deluge valve shall be 12 Kg/ Cm2

3.3 Size and capacity of deluge valves shall be as under.

Size (mm)	Rated Flow (LPM)	Working Pressure (kg/cm2g)
80	11501	7.0 to 10.5
100	5000	7.0 to 10.5
150	13500	7.0 to 10.5
200	18500	7.0 to 10.5

3.4 Deluge valve shall be provided with solenoid operated water release valve for remote manual operation in addition to automatic operation of deluge valve.

4.0 Material of construction for deluge valve.

4.1 For non-saline water supply

i.	Body	:	cast iron to IS 210Gr. FG 260.
ii.	Seat	:	Bronze
iii.	Clack	:	Graphite Iron
iv.	Diaphragm spindle and hinged pin	:	SS 304
v.	Test and drain valve	:	Cast steel
vi.	Outlet valve check valve	:	Cast steel
vii.	Installation stop valve	:	Cast steel

5.0 Construction and Performance of Deluge valve

5.1 Deluge valve shall be provided with clack to keep the valve closed through diaphragm unit.

5.2 The deluge valve shall also be fitted with an integral test and drain manifold. It shall have 50mm test and drain valve, air body drain valve and drip plug. The water motor gong shall be connected to the test drain valve, so that it gives an alarm as deluge valve opens.

5.3 The test valve shall allow water to flow through deluge valve to drain during testing of deluge valve and after fire. At open position the valve clack shall be held against its seating by an internal compression spring of sufficient strength to keep it in closed position till the pressure acting on the underside of it does not exceed 0.3 kg/cm2. The clack will open at the pressure exceeding 0.3 kg/cm2.

5.4 The drainpipe work shall be designed to periodically test rate of flow available in the system to satisfy the requirements appropriate to the hazard class for which deluge valve is provided.

5.5 On detector pipe manifold test valve, isolation valve, check valve, strainer and restricted orifice shall be provided. Both detector pipe work and supply line shall be terminated with flanged ends.

5.6 In addition to the above an electric pressure switch shall be provided to give alarm at “Low pressure”. Low pressure alarm shall be set at 1.7 kg/cm2.

5.7 Provision of changing the set pressure of both alarms shall also be provided.

5.8 The alarm switches shall thus activate with alarm to initiate warning of fire. Vendor shall confirm the set pressure based on inlet water supply.

5.9 An isolation gate valve rising spindle type shall be provided at inlet, outlet, and by-pass line of each deluge valve. A Y type strainer shall also to be provided for each deluge valve.

5.10 When deluge valve is in a hazardous area, SOV and alarm switches shall be explosion proof / intrinsically safe and suitable for hazardous area.

5.11 Each deluge valve shall have clear marking of deluge valve tag no, inlet line, by-pass line, detection line etc.

5.12 The deluge valve shall be tested for operation at set pressure and operation of alarms at set pressure. For testing and setting of the deluge valve, a priming valve and vent valve shall be provided. At all the times while testing the deluge valve, the deluge valve body shall remain full of water.

5.13 Pressure drop across deluge assembly shall be minimum and required pressure at remote nozzle pressure shall be achieved in any case.

5.14 The complete valve assembly shall be of good workmanship and finish, and free from burrs and sharp edges. All water ways shall have smooth finish.

5.15 Deluge valves shall be tested to a test pressure of 18 kg/cm2.

6.0 INSPECTION AND MARKING OF DELUGE VALVE

6.1 TATA POWER or its authorized representative shall have access at all reasonable times to the manufacturer’s works, where the Deluge valves ordered are being manufactured and/or tested. Any defect / shortcomings pointed out shall be rectified to the satisfaction of inspectors.

6.2 Deluge valve shall be permanently marked with purchaser’s name, design, and test pressure.

WorkflowCompleted Printed By: AMAN GUPTA - 31/Jul/2025 - A

7.0 Deluge Valve Local Control Panel (LCP) Requirements.

7.1 In Local deluge valve control panel (DVLCP) shall interfaces with all necessary interlocks, relays, pressure switches, indicating lamps are wired. These panels will be located at deluge valve housing. Necessary interlocks with main fire alarm panel (MFAP) shall be provided.

7.2 The DVLCP panel shall be provided with minimum following facilities

i. Power On (Indication)
ii. Low Low water Pressure (fire signal)
iii. DV operated
iv. Solenoid valves fail to open signal
v. Electronics Hooter to notify DV has been operated
vi. Switch for power on/Off
vii. Push Button to operate solenoid valve of Deluge valve
viii. Acknowledge switch for Alarm accept

7.3 Enclosure for deluge valve control panel shall confirm to IP 55 / NEMA 4.

7.4 All electronic equipment such as Solenoid Operated Valve (SOV), pressure switch, pressure gauge shall have IP 55 enclosure

8.0 Deluge valve housing

8.1 If section B of the main specification does not require specific of prefabricated deluge cabinet, then deluge valve housing as per this specification is require for each DV.

8.2 Deluge valve housing shall be provided for each deluge valve to protect the deluge valve operator from convection and radiation heat during fire of the transformer / protected area.

8.3 This deluge valve housing shall also protect the deluge valve and its accessories from physical vandalism and environmental damages.

8.4 Deluge valve housing shall be masonry structure with RCC roof and column. Complete civil structure shall follow applicable codes and standards of civil engineering.

8.5 Deluge valve housing shall be placed minimum 6 meter away from the hazard to be protected.

8.6 In case of coal conveyor deluge valve housing shall be located at either end of the coal conveyor. Vendor can also house two or more than two deluge valves in one housing.

9.0 Performance requirement

9.1 Before dispatch the deluge valve shall be subject to testing as per approved QAP at shop.

9.2 Following minimum test / checks shall carried out on the deluge valve before dispatch to site

i. Mechanical Test for all parts.
ii. Dimension checks for all parts
iii. Polymer test on diaphragm and rubber parts as per applicable UL standard
iv. NDT- DPT, MPT
v. Hydro test
vi. Seat leak test
vii. Performance test

WorkflowCompleted Printed By: AMAN GUPTA - 31/Jul/2025 - A

viii. Painting and marking

9.3 After installation the following operations shall demonstrated to meet the performance as per NFPA15 requirement.

i. By actuating Quartzite bulb detector due to heat.

ii. Remote actuation from Main fire alarm panel.

iii. By opening manual override valve provided in deluge trim.

iv. By pressing push button on Deluge valve control panel

v. By actuation Manual call point provided near deluge valve.

9.4 Performance testing shall be carried out as per NFPA 15 only.

10.0 Spares

10.1 Bidder shall provide following mandatory spares with quoted price.

Sr. No	Item Description	Minimum Qty required
1	Solenoid Valve	10% or Minimum 1 No whichever is higher
2	Pressure switch	10% or Minimum 1 No whichever is higher
3	Pressure Gauge	10% or Minimum 1 No whichever is higher
4	Limit Switch	10% or Minimum 1 No whichever is higher

10.2 Bidder to provide recommended spare list for deluge valves and its accessories for the next 3 years of operation.

11.0 Data Submission

11.1 Bidder shall furnish drawings and data sheet for information along with the Offer.

11.2 Drawing document to be submitted by bidder after award of Contract

i. Quality Assurance Plan (QAP).

ii. Detailed P&I diagram complete with all items, piping with designation, size and materials of construction, valves, specialties, and instruments.

iii. Dimensional and cross-sectional drawings with part list and materials of construction for:

iv. Deluge valve GA.

v. Details of the trims

vi. ISI certifications and TAC approval certificates for all indigenous components and FOC/UL/FM/VDS approval documents for imported items like deluge valve, spray nozzle and detectors.

WorkflowCompleted Printed By: AMAN GUPTA - 31/Jul/2025 - A

Section B

Technical Requirement of Fire Protection and Detection System

Chapter No 2

Standard Specification for FIRE DETECTION AND ALARM SYSTEM.

(ENGG/ P&L/STD-SPEC/ 002)

Section B

THE TATA POWER COMPANY LIMITED

STANDARD

TECHNICAL SPECIFICATION

FOR

FIRE DETECTION AND ALARM SYSTEM

(DOCUMENT NO - ENGG/ P&L/STD-SPEC/ 002)

Tata Power

Generation Engineering

R2	14/5/2024	Revised and issued for use	J Shinde	D Das	N Mishra
R1	16/1/2022	Revised and issued for use	J Shinde	N Mishra	R Gadre
R0	3/7/2014	Issued for Info or Use	JSS	RSG	AJ
Rev. No	**Date**	**Description**	**Prepared By**	**Checked By**	**Approved By**

WorkinProgress Printed By: AMAN GUPTA - 31/Jul/2025 - A

Contents

1.0 Scope 3
2.0 Codes & Standards 3
3.0 Design Requirement 3
3.1 **General** 3
3.2 **Number, Layout Requirements and Grouping of Detectors.** 4
4.0 Technical Particulars of Products in Fire Alarm System- General Requirement. 4
4.1 **Main Fire Alarm Panel** 4
4.2 **Central Processing Unit** 6
4.3 **Video Display Unit** 6
4.4 **Loop Control Module** 7
4.5 **Batteries** 7
4.6 **Repeater Panel** 7
5.0 Initiating Devices 7
5.1 **Smoke Detector** 7
5.2 **Fixed Temperature Heat Detectors** 8
5.3 **Combination Fixed—Temperature and Rate of Rise Heat Detectors** 8
5.4 **Manual Call Point** 8
5.5 **Projected Beam Type Detector** 8
5.6 **Ventilation duct smoke detector** 8
5.7 **Input Output Module** 8
5.8 **CO Detectors** 8
5.9 **IR Detector** 8
5.10 **Linear Heat sensing cable.** 8
6.0 Notification Devices 9
6.1 **Hooter cum Flasher** 9
6.2 **Fire Siren** 9
7.0 Miscellaneous Equipments 9
7.1 **Junction Boxes (JB)** 9
7.2 **Conduit** 9
7.3 **Cable** 9
8.0 Installation 10
9.0 Performance Test 10
10.0 Spares 10
11.0 Quality assurance Requirement 11
12.0 Data Submission By Bidder 11
12.2 **To be Submitted with Bid** 11
12.3 **To be Submitted after Award of contract** 11

1.0 Scope

1.1 The scope includes the design, engineering, manufacturing, supply, installation, commissioning and testing of the addressable fire detection & alarm system for specified area as shown on the drawings and as specified in main specification.

2.0 Codes & Standards

2.1 All equipment, system and services covered under this specification shall comply with all currently applicable statutes, regulations, and safety codes in the locality where the equipment will be installed. Nothing in this specification shall be construed to relieve the VENDOR of this responsibility.

2.2 The standards not indicated in the specification are also acceptable subject to the prior approval of purchaser.

2.3 In the event of any conflict between the codes and the standards referred to in the specification and the requirements of this specification, more stringent of the two shall govern and interpretation of the Purchaser shall be final and binding on Supplier for quoted price.

2.4 List of Standards

2.4.1 National Fire Protection Association (NFPA) - USA:

i.	NFPA 72	National Fire Alarm Code
ii.	NFPA 2001	Clean Agent Extinguishing Systems
iii.	NFPA 101	Life Safety Code
iv.	NFPA 90A	Air conditioning & ventilation system
v.	NFPA 850	Recommended Practice for Fire Protection for Electric Generating Plants and High Voltage Direct Current Converter Stations
vi.	NFPA 851	Recommended Practice for Fire Protection for Hydroelectric Generating Plants

2.4.2 IS 2189

2.4.3 IS 3034

3.0 Design Requirement

3.1 **General**

3.1.1 The fire detection and alarm system shall comprise of Automatic soft Addressable Modular design Main fire alarm control panels, Repeater panels, smoke detectors, heat detectors, flame detectors, Remote response indicators and Manual call points, hooters flashers, modules etc.

3.1.2 Intelligent, Addressable double action type manual call points, distributed throughout the plant, at each natural exit of each room, & along the access road.

3.1.3 Intelligent, Addressable type optical smoke, heat, multi sensor & flame detectors, distributed according to NFPA 72, IS 2189 & as per standard engineering practice throughout the area covered under scope of work.

3.1.4 In the event of a failure, a short circuit, or a wire break in a detector or in the fire alarm system cable, all other detectors and connected input and output modules must remain fully functional.

3.1.5 There must be an individual user management with password and user level possible; furthermore, each user change must be recorded.

3.1.6 Original equipment manufacture of the main fire alarm panel must handover all dongle, access key card, password to enable purchaser or authorised person to access the main fire alarm panel and do the modification, reconfiguration of the devices to meet the new requirement due to change in layout / configuration of the room / area / station. This requirement is must for all main fire alarm panel must abide by the bidder.

3.1.7 It must be possible to connect the fire alarm system to computer systems or fire alarm control systems by means of data interfaces.

3.1.8 The Main fire alarm panel must be equipped with interfaces to be integrated into the Tata Power DCS/ SCADA system.

3.1.9 Fire alarm system shall be designed to provide continuous surveillance against fire in the areas covered by the system under all conditions. Relative Humidity to be considered for the equipment being supplied is 95% and the devices being supplied should not give false alarms at ambient temperature conditions (maximum ambient temperature is 50 Deg. C and Minimum ambient temperature is 10 Deg. C)

3.1.10 All the equipment quoted shall be suitable for continuous operation and satisfactory performance for the following power supply condition.

a) Variation in supply voltage : +/- 10%
b) Variation in supply frequency : +/- 5%
c) Combined voltage and frequency variation : +/- 10%

3.1.11 All equipment's viz. Detection devices, Notification devices, Panels shall have UL / FM / VDS approval.

3.2 **Number, Layout Requirements and Grouping of Detectors.**

3.2.1 The number of fire detectors to be installed is governed by the total area to be protected, type of building construction, air movement, air velocity, ceiling obstructions, smoke value concentration of equipment in the area covered and the sensitivity required. Bidder to refer drawings of the area for designing of the complete system.

3.2.2 Detector shall be placed as per NFPA 72 and IS 2189 strictly.

3.2.3 If ducts / beams which is having depth from finish ceiling level of more than 600mm and make obstruction to the spreading of heat / smoke, then in each void shall be treated as separate area and shall be provided with at least one separate detector in each void.

3.2.4 The individual detectors shall be wired on a common connecting line. The number and exact location of detectors to be installed in the various areas shall be finalized during detailed engineering stage by the bidder.

3.2.5 Looping philosophy shall be decided during detail engineering in consultation with the Purchaser.

3.2.6 Looping shall be such that each identical area in each unit / station / building shall have separate loop so that alarm / maintenance of loop in particular area shall affect the loop only.

4.0 <u>Technical Particulars of Products in Fire Alarm System- General Requirement.</u>

4.1 **Main Fire Alarm Panel**

4.1.1 General Requirements

i. Equipment supplied against this specification shall be given tropical and fungicidal treatment in view of climatic conditions prevailing at site as described in site information.

ii. All cable entries shall be from bottom or suite at site condition and suitable undrilled cable gland plate shall be provided. The painting shall be with epoxy powder coating and the paint shade shall be matching with that of the existing adjoining panels.

iii. All doors, removable covers etc. shall be provided with neoprene gaskets all around. Ventilating louvers if provided, shall have screens and filters. The screens shall be made of either brass or GI wire mesh.

iv. Each panel/cubicle shall be provided with a 230V, 1 phase, 50 Hz, 40W fluorescent lighting fixture for interior illumination controlled by ON-OFF switch and 230V, 1 phase, 5/15 Amp, 3/5 pin receptacle. Power source for interior lighting and receptacles shall be completely independent of control power source.

v. All foundation hardware/accessories as may be required for mounting the panel/ cubicle(s) shall be provided by the Bidder. All panel/ cubicle(s) shall have a 25 x 3 mm copper-earthing strip running through the length of the panel/ cubicle(s) and at both ends suitable stud type terminals shall be brought out for connections to PURCHASER's earthing grid.

4.1.2 Construction & Design of Main Fire Alarm Panel

i. All the components of the Fire detection & alarm System shall be as far as possible of modular construction and the modules or sub-units shall be plug in type for easy installation and maintenance.

ii. The fault diagnostics capability built into the system shall be up to the major component level. The fault messages shall be in clear plain texts.

iii. All components & modules shall be clearly and unambiguously marked, and all wiring shall be colour coded & tagged.

iv. Ground terminals with isolating links shall be provided. Bidder to indicate any specific earthing requirement for the fire detection & alarm System.

v. No component will be connected by dry soldering. Solder will not be applied on the end contacts of PCB to improve contacts.

vi. All plugs in PCB's should be coded for ensuring its insertion in correct position.

vii. Clips or channels shall be provided for securing the PCB in position.

4.1.3 Operation & Performance Requirement of Main Fire Alarm Panel

i. The automatic fire alarm system must be assembled using a microprocessor-controlled detectors. The controllers and the software for the fire alarm system must be laid out in such a way that a single error of any electronic element or of an external device does not compromise the fire alarm system from functioning normally.

ii. In the event of a single fault in the control panel or in peripheral devices, all detectors and functions must remain fully functional, and all controllers must remain fully active. When the fault is detected and displayed whilst the system must continue to function fully.

iii. Every detector and every controller module must constantly check its own status and send status information to the microprocessor-controlled and monitored fire alarm control panel and give feedback to MFAP.

iv. Main fire alarm panel shall perform

a) Supervise and monitor all intelligent addressable detectors and monitor modules connected to the system for normal, trouble and alarm conditions.

b) Supervise all initiating signalling and notification circuits throughout the facility by way of connection to monitor and control modules.

c) Detect the activation of any initiating device and the location of the alarm condition. Operate all notification appliances and auxiliary devices as programmed.

d) Visually and audibly annunciate any trouble, supervisory, security or alarm condition on operator's terminals, panel display, and annunciator.

v. All above condition shall be reflected in Cause-and-effect diagram and shall be checked at site during commissioning of the system.

vi. To obtain early warning of incipient or potential fire conditions, the system shall support a programmable option to determine system response to real-time detector sensing values above the programmed setting. Two levels of Pre-alarm indication shall be available at the control panel: alert and action.

vii. The system shall provide means to allow panel programming either through an off-line software utility program away from the panel or while connected and on-line.

viii. The system shall also support upload and download of programmed database and panel executive system program to a Personal Computer/laptop.

ix. For System which is upgraded through use of manufacturer USB / DONGLE, bidder must submit the same to purchaser

x. The system shall support different password levels, master, and user. Only the master password shall allow access to password change screens.

xi. Sensitivity Adjust: The system shall provide Automatic Detector Sensitivity Adjust based on Occupancy schedules including a Holiday list of up to 14 days.

xii. The system shall provide means for setting Environmental Drift Compensation by device.

xiii. The Addressable Main Power Supply shall provide sufficient power to the CPU, using a switching 24 VDC regulator and shall incorporate a battery charger for 48 hours of standby power using dual rate charging techniques for fast battery recharge.

xiv. The Addressable Main Power Supply shall provide a very low frequency sweep earth detect circuit, capable of detecting earth faults.

4.1.4 Operator Control

Operator control panel shall be provided with below

a) Acknowledge Switch:
b) Signal Silence Switch:
c) Drill Switch:
d) System Reset Switch:
e) Lamp Test:
f) Scroll Display Keys:
g) Print Screen:

4.2 **Central Processing Unit**

i. The Central Processing Unit shall be communicate with, monitor, and control modules within the control panel. Removal, disconnection, or failure of any control panel module shall be detected and reported to the system display by the Central Processing Unit.

ii. The Central Processing Unit shall also provide a real-time clock for time annotation, to the second, of all system events. The time-of-day and date shall not be lost if system primary and secondary power supplies fail.

iii. The CPU shall be capable of being programmed on site without requiring the use of any external programming equipment.

iv. The CPU and associated equipment are to be protected so that voltage surges or line transients will not affect them.

v. Each peripheral device connected to the CPU shall be continuously scanned for proper operation. Data transmissions between the CPU and peripheral devices shall be reliable and error free. The transmission scheme used shall employ dual transmission or other equivalent error checking techniques.

4.3 **Video Display Unit**

i. The display assembly shall contain, and display as required, custom alphanumeric labels for all intelligent detectors, addressable modules, and software zones.

ii. The system display shall provide a 240-character backlit alphanumeric Liquid Crystal Display (LCD). It shall also provide Light-Emitting-Diodes (LEDs) that indicate the status of the following system parameters: AC POWER, FIRE ALARM, PREALARM, SECURITY, SUPERVISORY, SYSTEM TROUBLE, OTHER EVENT, SIGNALS SILENCED, POINT DISABLED, and CPU FAILURE.

iii. The system display shall include the following operator control switches: ACKNOWLEDGE, SIGNAL SILENCE, RESET, DRILL, and LAMP TEST. Additionally, the display interface shall allow scrolling of events by event type including, FIRE ALARM, SECURITY, SUPERVISORY, TROUBLE, and OTHER EVENTS.

iv. A detachable keyboard shall be provided that may be used for programming, testing, and control of the system. Individual keys shall be provided on the keyboard for the ACKNOWLEDGE, RESET, LAMP TEST, SYSTEM TEST, and SIGNAL SILENCE functions of the control panel.

v. Size of the monitor of the fire detection system shall be 21 Inch and shall be in main control room as per direction of site in-charge.

4.4 **Batteries**

i. The battery shall have sufficient capacity to power the fire alarm system for not less than forty-Eight hours & 30 minutes of alarm condition upon a normal AC power failure.

ii. The batteries are to be completely maintenance free. No liquids are required. Fluid level checks for refilling, spills, and leakage shall not be required.

iii. If necessary, to meet standby requirements, external battery and charger systems may be used.

4.5 **Repeater Panel**

i. Repeater panel shall be listed VDS approved / UL 9th edition listed. It shall have LCD display like main panel.

ii. Each Repeater panel shall be powered from main fire alarm panel.

iii. Enclosure for repeater panel shall be IP 55. Quantity of repeater panel shall be decided during detail engineering.

iv. Each repeater panel shall have the following indicators and operator Controls:

a) Alarm Acknowledge/Signal Silence/Reset Switch
b) Power LED
c) System alarm LED
d) System trouble LED
e) Local piezoelectric signal

5.0 Initiating Devices

5.1 **Smoke Detector**

i. The detectors shall constantly monitor their surrounding conditions and shall calculate the optimum smoke and heat sensitivity for the area it is deployed. The sensitivity of the smoke detection part shall permanently and automatically adapt to the surrounding conditions.

ii. These shall be plug—in type separate base and sensing unit. A LED shall be provided in the base, which will operate when detector has been activated.

iii. Adequate numbers of detectors to be provided in each room floor and ceiling voids.

iv. All floor and ceiling voids mounted detectors shall be provided with remote lamp indicators.

v. For ceiling points this should be installed on the suspended ceiling and for floor void lamp on the wall near the detector at the height of 2 Meter from FFL.

vi. Care should be taken to protect the detectors from proximity of air flow from ducts. Detectors shall be installed not less than one meter from air diffuser.

vii. Detectors shall be provided for every beam pockets beam depth is more than 600mm as per the requirements of NPFA 72.

viii. While installing smoke detectors they shall be located where the largest combustible gas concentration can be expected.

ix. The number of detectors and their location shall be so selected that complete coverage is obtained. The zones of individual detectors shall overlap, and no blind zone shall be left. Spacing per detector shall be such that it covers complete area.

5.2 **Fixed Temperature Heat Detectors**

i. Fixed temperature heat detectors shall be entirely electronic in operation and have a thermistor as ambient temperature sensor with fully reset table.

ii. Detector temperature rating shall be approximately 120% of the maximum expected ambient temperature of the area to be protected.

5.3 **Combination Fixed—Temperature and Rate of Rise Heat Detectors**

i. The fixed temperature element shall be independent of the rate of rise element.

ii. The rating for the combination fixed temperature and rate of rise type shall be approximately 120% of the expected ambient temperature arid rate of rise shall have the setting of 8ºC per minute.

iii. All elements shall be reset table and entirely solid state. Adequate special detectors as required for air-conditioning system shall be provided accordingly.

5.4 **Manual Call Point**

i. Manual call point shall be provided at several convenient points located in the natural path of each exit, so that alarm can be given by operating personnel independently of automatic system.

ii. Each manual call point shall be provided with Notification devices (Audible and Visual) irrespective the area where MCP has been located to annunciate the local alarm in case of fire.

iii. All MCP shall be double action Type.

iv. Manual pull station for zone shall be connected on the same circuit as the detector being provided for the zone.

v. Manual call point which is located inside the room shall have IP rating of IP44

vi. Manual call point which is located outside area (external MCP) enclosure shall be IP66.

vii. Manual call point shall be inclusive of control, Monitor module to make it addressable.

5.5 **Projected Beam Type Detector**

i. In high ceiling area projected type smoke detector should be provided having sensitivity 30% ±5% of Total Obstruction and spacing as per Manufacturer recommendation.

ii. Beam detector should be provided with Metal canopy fabricated from metal stripes. This Canopy will fix on the detector so as it cannot obstruct the projected path of the detector and protect the device by bird's intrusion, shape and size will be decide during detail engineering.

5.6 **Ventilation duct smoke detector**

i. The Detector should be able to work up to 20m/s Air flow. The detector should have inbuilt fault isolator.

ii. Approval: VdS / UL 9th edition

5.7 **Input Output Module**

i. The input output module, control module shall contain 4 inputs for the monitored and non-monitored querying of potential-free contacts. It shall contain an integrated short-circuit to achieve the desired function.

ii. The protection class of Input module shall be IP 66 with case and operating Ambient temperature range shall be -20 to +60°C

iii. Approval: VdS / UL 9th edition

5.8 **CO Detectors**

i. The area where chances of CO accumulation are more such as underground area, basement parking, Coal hopper etc. shall be provided with CO monitor.

5.9 **Linear Heat sensing cable.**

i. Linear heat sensing cable shall be digital type.

ii. Braiding material of LHS cable shall be SS.

iii. Zone length of LHS cable shall not exceed 300 meters.

6.0 Notification Devices

6.1 **Hooter cum Flasher**

i. A warning hooter cum flasher shall be installed and shall be activated simultaneously with detection of fire in particular zone.

ii. Every compartment to be provided with hooter cum flasher installed at entrance of the room.

iii. Flasher shall be red and visible enough to be noticed even during daytime for quick identification by the concern authority.

iv. Enclosure of Alarm hooter cum flasher shall be weatherproof (IP55).

v. Sound intensity of hooter shall be 90 dB from 1 meter of equipment.

vi. During testing of complete system, it shall transmit pre-recorded test voice message to aware the public about the ongoing test.

6.2 **Fire Siren**

i. Fire sirens supplied shall have an identical wave tone. The sirens shall be capable of being heard distinctly throughout the plant area. Average ambient sound level shall be 95 (dBA).

ii. The sirens shall be suitable for installation outdoors and shall be complete with rain shades and all other mounting accessories.

iii. The sirens shall be motor operated type with AC motors of three-phase design. The Operator panel required for switching the sirens ON / OFF shall be supplied with them. Enclosure of the panel shall have IP65.

7.0 Miscellaneous Equipment's

7.1 **Junction Boxes (JB)**

i. Junction boxes shall be fabricated out of 2.0mm thick CRCA sheet steel & shall be hot dip galvanized. For outdoor installation, they shall be of cast iron type and provided with a canopy at the top.

ii. JBs for outdoor installation shall have a degree of protection of IP-55 & shall be provided with neoprene gasket.

iii. All the junction boxes shall have a weeping hole at the bottom plate and provided with necessary double compression brass cable glands. Two earthing terminals suitable for terminating 8 SWG GI wire shall be provided. All structures required for mounting the JBs shall be included in Contractor's scope.

7.2 **Conduit**

i. Conduit shall be in accordance with The National Electrical Code (NEC), local and state requirements.

ii. Where required, all wiring shall be installed in conduit or raceway. Conduit fill shall not exceed 40 percent of interior cross-sectional area where three or more cables are contained within a single conduit.

iii. Cable must be separated from any open conductors of power, or Class 1 circuits, and shall not be placed in any conduit, junction box or raceway containing these conductors.

iv. All circuits shall be provided with transient suppression devices and the system shall be designed to permit simultaneous operation of all circuits without interference or loss of signals.

v. Conduit shall not enter the fire alarm control panel or any other remotely mounted control panel equipment or back boxes, except where conduit entry is specified by the FACP manufacturer.

7.3 **Cable**

i. Wiring shall be in accordance NFPA 72, Class A and as recommended by the manufacturer of the fire alarm system. Number and size of conductors shall be as recommended by the fire alarm system manufacturer, but not less than 0.5 sq. mm for Initiating Device Circuits and Signalling Line Circuits, and 1.5 sq. mm for Notification Appliance Circuits.

ii. All wire and cable shall be listed and/or approved by a recognized testing agency for use with a protective signalling system.

iii. Wire and cable shall have a fire resistance rating suitable of 2 hours at 650-degree temperature

iv. All field wiring shall be electrically supervised for open circuit and ground fault.

8.0 Installation

8.1 Installation shall be done in accordance with the NFPA 72, applicable codes, as shown on the drawings, and as recommended by the equipment manufacturer.

8.2 All conduit, junction boxes, conduit supports, and hangers shall be concealed in finished areas. Smoke detectors shall not be installed prior to the system programming and test period. If construction is ongoing during this period, measures shall be taken to protect smoke detectors from contamination and physical damage.

8.3 All fire detection and alarm system devices, control panels and remote annunciator shall be flush mounted when located in finished areas and may be surface mounted when located in unfinished areas.

8.4 Manual call point shall be mounted on 1200mm above finish floor level.

9.0 Performance Test

9.1 The service of a competent, factory-trained engineer or technician authorized by the manufacturer of the fire alarm equipment shall be provided to technically supervise and participate during all the adjustments and tests for the system. All testings shall be in accordance with NFPA 72.

9.2 Before energizing the cables and wires, check for correct connections and test for short circuits, ground faults, continuity, and insulation.

9.3 Close each sprinkler system flow valve and verify proper supervisory alarm at the FACP.

9.4 Verify activation of all water-flow switches.

9.5 Open initiating device circuits and verify that the trouble signal actuates.

9.6 Open and short signalling line circuits and verify that the trouble signal actuates.

9.7 Open and short notification appliance circuits and verify that trouble signal actuates.

9.8 Ground all circuits and verify response of trouble signals.

9.9 Check presence and audibility of tone at all alarm notification devices.

9.10 Check installation, supervision, and operation of all intelligent smoke detectors using the walk test.

9.11 Each of the alarm conditions that the system is required to detect should be introduced on the system. Verify the proper receipt and the proper processing of the signal at the FACP and the correct activation of the control points.

9.12 When the system is equipped with optional features, the manufacturer's manual shall be consulted to determine the proper testing procedures. This is intended to address such items as verifying controls performed by individually addressed or grouped devices, sensitivity monitoring, verification functionality and similar.

9.13 During above testing each testing will verified as per “Cause and Effect Chart”

9.14 System performance deemed acceptable if bidder design, supply, install and commission the system as per scope of work and prepare the submit filled in cause-and-effect diagram of each equipment in each area and demonstrated performance of the entire system satisfactorily to the purchase for 24 months from date of handover of the system. The cause-and-effect diagram shall be submitting by bidder to purchaser every month.

9.15 At the end of every month bidder must submit report fetched from log of main fire alarm panel and its satisfactory resolution signed by purchaser. This will be main criteria for the acceptance of the entire system and release of the security deposit from the purchaser to bidder.

10.0 Spares

10.1 A list of Essential spares is specified in the list below.

Schedule of Spares for Fire Detection & Alarm System

Sr. No	Item Description	Qty
1	Detector	10% Sets of each type used
2	Manual Pull Station	5% installed capacity of each type used.
3	Flasher	5% installed capacity of each type used.
4	Hooter	5% installed capacity of each type used.
5	Response Indicator	5% installed capacity of each type used.
6	Control Module	5% installed capacity of each type used.
7	Monitor Module	5% installed capacity of each type used.
8	LHS cable with its module and LHS controller.	10% of installed quantity

11.0 Quality assurance Requirement

11.1 QAP to be prepared by Bidder and get approval before manufacturing.

11.2 Bidder is responsible for getting purchaser approval for QAP and Material dispatch certificate before sending material to site

12.0 Data Submission by Bidder

12.1 All the drawings and instruction manuals submitted should be written in English language, MKS Units and / or SI Units. The drawings shall have sufficient details to indicate the type, size, arrangement, weight of components, breakdown for packing and shipment, external connections, fixing arrangement, interconnection with other equipment, clearances and space required, foundation for installation etc. Soft copy of the drawings in pdf & auto CAD form are required in addition to hard copies.

12.2 The instruction manuals shall contain full details and drawings of all the equipment furnished, erection procedures, testing procedures, operation procedures, maintenance procedures, handling, and storage procedures of the equipment.

12.3 A separate section of the manual shall be devoted to each type of the equipment with list of parts, relevant pamphlets etc. Instructions shall include preventive and predictive maintenance schedules.

12.3.1 Bidder to submit all the drawings, documents, calculation, catalogue, operation & maintenance manual of all equipment's etc. covered under the scope of this specification to be submitted for Purchaser approval.

12.4 **To be Submitted with Bid**

12.4.1 Technical data sheet of main fire alarm panel, repeater panel, Optical smoke detector, manual call point, heat detector, monitor module, workstation, hooter, flasher, siren, junction boxes, pressure switch, cable glands, cable fittings.

12.4.2 Quality assurance plan of main fire alarm panel, repeater panel, optical smoke detector, manual call point, heat detector, monitor module, workstation, hooter, flasher, siren, junction box, pressure switch, cable glands, cable fittings.

12.4.3 Type test certificates of all equipment's showing IP conformance according to project specification.

12.4.4 Company profile

12.4.5 Commissioning certificates of similar system installed in power plants, substation, & industrial complex.

12.5 **To be Submitted after Award of contract**

12.5.1 General arrangement drawings showing outline dimensions, cable entry openings, fixing / foundation details, weights, and door openings.

12.5.2 Front & cross-section views showing arrangement details of equipment and terminals and with a Bill of Material for all equipment.

12.5.3 Schematic diagram indicating terminal numbers for external connections.

12.5.4 Manufacturer's technical literature on various equipment's supplied.

12.5.5 Wiring diagram of complete excitation system and accessories. The correctness of this drawing shall be the responsibility of the bidder.

12.5.6 Cause and Effect chart.

12.5.7 Performances guarantee Test procedure.

12.5.8 Operation & maintenance manuals shall be furnished for PURCHASER's review. Operation manual in pdf version is a must. The contractor shall provide 5 copies of complete operation, maintenance, and spare parts manual for fire alarm system in English languages, includes.

i. Detailed outline drawings with part numbers.

ii. Detailed procedure for disconnecting and re—assembly of equipment

iii. Detailed procedure for operation and maintenance

12.5.9 As built drawings of all area

Technical Requirement of Fire Protection and Detection System

Chapter No 3

Standard Specification for LP Piping System - Fire Protection.

ENGG/ P&L/STD-SPEC/ 004

THE TATA POWER COMPANY LIMITED

Standard Specification

TECHNICAL SPECIFICATION

FOR

LP Piping (Fire Protection System)

(STANDARD SPECIFICATION NO - ENGG/ P&L/STD-SPEC/ 004)

Tata Power

Project Engineering

R0	01-04-2014	XXXXXXXXXXXXXXXXX	SD	RSG	AJ
Rev No	**Date**	**Description**	**Prepared By**	**Checked By**	**Approved By**

Contents

Clause No.	Description	Page No.
1.	Scope	3
2.	Applicable Codes and Standards	3
3.	Piping System and Layout Design	3
4.	Valves	6
5.	Protection of underground pipes	8
6.	Temporary piping arrangement and accessories required	8
7.	Hydro Testing	9
8.	Painting	9
9.	Spares	9
Attachment / Annexure		
1.	Data Sheet for	
2.		
3.		
4.		

1. **Scope :**

Piping being covered under this specification is for fire protection system with Clarified water and Raw Water. The scope covers manufacturing, testing, supply, engineering, erections, testing of piping, fittings, valves, etc involved in Fire fighting system.

2. **Applicable Codes and Standards :**

Applicable codes and standards for current specifications have been indicated in Table 2 below :

Table 1

Sl.no.	Standard	Description
BIS (Indian Standards)		
1.	IS 3589	Steel pipes for water and sewage (168.3mm to 2540mm outside diameter)
2.	IS1239 (Part 1)	Steel Tubes , Tubular and Other Wrought Steel Fittings
3.	IS1239 (Part 2)	Steel Tubes , Tubular and other steel fittings
4.	IS 15337	Coal Tar Based Anticorrosion Tape for protection of underground mild steel pipelines
5.	IS10221	Coating and Wrapping of underground mild steel pipes lines.
6.	IS 1978	Line Pipe
7.	IS 14846	Sluice Valves for Water Works purposes (50 to 1200mm Size)
8.	IS 10605	Steel Globe Valves (Flanged and Butt Welded Ends) for Petroleum , Petrochemical and Allied Industries
9.	IS 5312 (Part 1)	Swing Check type Reflux (Non-Return) Valves for Water Works Purposes
10.	IS 1477 (Part 1)	Code of Practice for Painting of Ferrous Metals in Buildings
11.	IS 1477 (Part 2)	Code of Practice for Painting of Ferrous Metals in Buildings
ASME / ANSI (American Standards)		
12.	B 36.10	Welded and Seamless Wrought Steel Pipe
13.	B16.5	Pipe Flanges and Flanged Fittings
14.	B 16.11	Forged Fittings Socket-Welding and Threaded
15.	B16.47	Large Diameter Steel Flanges
16.	B16.34	Valves – Flanged ,Threaded and Welding End
17.	B16.9	Factory Made Wrought Buttwelding Fittings
18.	B31.1	Power Piping

3. **Piping System and Layout Design**

3.1. Computerized Flow Analysis

Vendor is required to design the complete system and submit the design and calculation documents for approval purpose. Vendor is required to carry out flow analysis for network using Pipenet Software submit the native files for review purpose along with the report.

3.2. Deviations on software programs and Outsourcing of Engineering activities by Vendor

Vendor should ascertain the capabilities and software availability of the agencies being outsourced. The vendor could use any other internationally acceptable software having inbuilt NFPA codes and piping model (files) compatible with Pipenet.

Use of software not meeting the above will not be acceptable.

Vendor should ensure that the outsourced agency has executed at least 2 similar projects of same scale or larger for reputed organization. Vendor will have to submit details of the agencies that will be considered for outsourcing of engineering activities. Acceptance of outsourcing agency is at the sole discretion of purchaser.

3.3. Supports Design

The span of supports to be considered for sizes indicated will be as per table 2. For other sizes or for any reasons wherein given support spans are not applicable, the vendor will have to calculate the support span required and submit the same for purchaser's approval.

All supporting structure will have to be adequately painted or protected against environmental attack of corrosion. The site condition should be taken into account while finalising specification if specific painting specification is not provided in the Project specification.

All structures which are located at ground level (0.0m elevations) will have to be elevated to prevent damage due to water logging at the bottom of the structure.
All support drawings will have to be submitted by the vendor for review. In case of simple supports, the arrangement will have to be indicated in the piping drawings.

3.3.1. Standard Maximum Pipe Support Spans

Standard suggested maximum pipe Support spans are as follows:

Table 2

Pipe Size (DN)	Span (m)
25	2.1
50	3.0
80	3.7
100	4.3
150	5.2
200	5.8
300	7.0
400	8.2
500	9.1
600	9.8

a) The supports spans indicated in the above table are for water as service fluid

b) The support span indicated is for horizontal straight run of pipes without consideration for any concentrated loads like valves , NRV's , flanges etc.

c) Maximum sag permitted in pipes is 2.5mm between two supports

3.4. Insert Plates

Details and position of Insert plates required to support the piping will have to be submitted by the vendor for purchaser's review and approval.

In case, at any particular position the insert plates are missed out or were not indicated by the vendor for any reason then vendor will have to provide Anchor Fastner to support the pipes.

3.5. Pipe Tappings and Branching

All liquid tapping should be taken from the bottom of the pipe only. Use of half coupling will not be acceptable for line tapping. Standard Tee joints as per ASME B16.9 standard should be used.

For detailed description on tapping and branching connection refer to Data Sheet D1

3.6. Piping on vessels and tanks

Straight pipes should not be used to connect tanks and vessels. Expansion loops should be used to ensure that the stress on the tank nozzle is minimum.

Piping immediately after the nozzle should be adequately supported to ensure that the stresses on the tank nozzles are minimum.

3.7. Piping Material Specification

For Piping Material Specification (PMS) refer data sheet D2

3.8. Laying of pipes

Vendor to ensure that the piping system will be laid as per the finalized layout. Any deviations in the layout will have to be with prior consent of purchaser. Vendor is responsible for avoiding interferences with structure, equipment and piping laid by other parties. The approval of purchaser on layout drawings does not dissolve Vendor from its responsibility of laying piping without interferences. All cost associated to remove interference noticed during engineering or erection should be borne by Vendor.

3.9. Rack Piping

When pipes are routed on pipe racks, vendor has to ascertain the position of pipes that may be present which belong to other services. Vendor should provide necessary loading details of piping to carry out analysis and design of structural of the rack.

3.10. Velocity of fluid within pipes and valves

Maximum velocity of fluids within pipes and valves should not exceed 2.5m/s.

3.11. Cavitation

Vendor to take adequate measures to ensure that there is no effect of cavitation at any point within the piping system.

3.12. Reducers

Eccentric reducers will be preferred in case of lines resting on flat surface. Whenever reducers are used in the suction side of the pump vendor to ensure that the reducers are positioned with flat side on top so as to eliminate the cavitation effect.

3.13. Low Point Drains and Air release vents

Vendor should provide a vent with gate type isolation valve on highest point to release trapped air.

In case there is a formation of a U loop in the system then it may be required for the vendor to provide separate Vent valve on the either side of the U loop

Vendor should provide adequate number of vents and drains on the piping system to vent and drain out air and water from the pipes. Drains should be directed to the nearest drain trench in the plant.

3.14. Galvanized Iron (GI) pipes

All GI Pipes & fitting are joined by either screwed type (with coupling) or Flange type (May be any other suitable method) except welding Method. Welding is NOT permitted on GI pipes and Fittings . Exceptionally If welding has been carried out on GI pipes with the Purchasers consent then the portion of galvanization exposed to high temperature will have to be recoated using suitable methods like spot galvanization.

4. Valves

4.1. Position Indicator and flow direction indication

Wherever specifically required , position indicator should be provided for the following valves of size NB65 and above.

a) All globe valves
b) All valves of outside screw type and rising hand wheel
c) All valves of inside screw type

All valves should be so designed that the hand-wheel moves in a clockwise direction to close the valve. The face of the hand-wheel should be clearly marked with the words 'OPEN' and 'CLOSE' and an arrow to indicate the direction for opening. All hand-wheels should be fitted with name plates.

Flow direction should be clearly embossed on the valve body for globe and check valves.

4.2. Rising Stem and OS &Y type arrangement

All gate and globe valves should be of rising stem, outside screw and yoke type. The design of valves should ensure a streamlined passage and gate valves should have low pressure drop. All globe valves should be capable of being closed against pressure and flow. Valve end details should be as specified in Data Sheet D3.

4.3. Non-detachable Locking arrangement

Valves that are to be kept in Normally full 'OPEN'/'CLOSE' position should be provided with a non-detachable locking arrangement. The locking arrangement provided should be subject to approval by the purchaser.

4.4. Valve Seats and discs

All globe valves and gate valves should be provided with back seating arrangement so that gland packing can be replaced while leaving the valve in service . The seats and discs should be easily renewable and/or should be suitable for easy re-facing and grinding. Valve discs should be of such design as to keep the seats tight when the valve body is subjected to pressure, temperature variations and piping stresses. Gate valves should close in both flow directions.

Hardness of seating surfaces should be a minimum of 350 BHN and a minimum differential hardness of 50 BHN should be provided between seats to prevent galling. This is not applicable for stellited seats.

4.5. Geared Operation

All gate, globe, Y-type and angle valves intended for manual operation and falling under the following categories should be equipped with gear for ease of operation and to ensure fast and tight closure:

Table 3

ANSI Pressure Rating	Valve Size
Class 300 and below	350 mm and larger
Class 600 and above	200 mm and larger

4.6. Wedge requirement

All gate valves of ANSI pressure rating class 150 and 300 should have solid or flexible wedge and ANSI pressure rating class 600 and above should have flexible or parallel slide type of wedge.

4.7. Bolted Bonnet

All forged valves should have bonnet construction or integral or welded type as indicated in the data sheet.

All cast valves of pressure rating upto class 600 should have bolted bonnet construction and class 900 and above should have bonnet construction of the pressure seal type

4.8. Trim requirement

All carbon steel cast valves of pressure rating upto class 150 and 300 should have stainless steel trim (13% Cr) unless otherwise specified in Data Sheet-D3

4.9. Y-globe valves

Y-globe valves should have flow area designed for minimum turbulence and pressure drop.

Forged steel needle and Y-type valves should have extra long thread chambers and a plug type disc which should be resistant to wear and foreign matter.

The stuffing box should be adequately deep and should be fitted with a high grade packing.

Stems should have fine pitch threads to permit fine adjustment. The discs and seats should be cone shaped.

5. Protection of underground pipes

5.1. Vendor should provide underground protection for all directly buried carbon steel piping in accordance with the technical requirements of of this specification.

5.2. 10% of the Field Butt welded joints shall be test by Radiography per welder. Other joints 10% DPT of Root and final weld joint.

5.3. Wrapping and coating of all pipes should be according to IS 15337 standard using coal tar tape. Thickness of the tape should be calculated as per IS 10221 standard. However for single wrapping, vendor to consider 4mm minimum thickness.

Details of tapes being supplied to be furnished by vendor as per Data Sheet D4

Tape application should be as per Clause 6 and Annexure 'A' of IS 15337 standard. The surface of the coated pipe can be covered up with craft paper when the pipeline is exposed for more than 3 days to sunlight.

Tapes supplied should conform to IS 15337 standard.

5.4. Pipelines provided with underground protection should be blast cleaned by shot blasting. Anti corrosive protection should be applied to the pipe within 2 hrs of blast cleaning of pipe. The pipe surfaces around field joints should be cleaned by PA wire brushing prior to application of anti corrosion treatment. Shot blasting to be carried out according to IS 1477

5.5. If shot blasting is not permitted within the premises then vendor to ensure that the pipes should be sand blasted at vendor's premises or vendor has to make necessary arrangements to carry out sand blasting out of the plant area.

6. Temporary piping arrangement and accessories required

All temporary piping, fittings, valves , tools, tackles, instruments, Blind Flanges, Pump etc. required for cleaning, hydrotesting etc. of piping included in the specification should be arranged by the Vendor within the contract price.

7. Hydrotesting

7.1. Hydrotesting of all pipes will have to be carried out at 1.5 times the design pressure using water as testing medium. In case of presence of Flow measuring devices, Pressure indicators , Temperature Indicators , Pressure Relief valves and other instrumentation on the lines, vendor has to ensure that these devices are either capable of withstanding the hydrotest pressure or in case required these devices may have to be removed temporarily from the system to carryout the hydrotest.

Vendor should fabricate, supply and install temporary strainers along with spool pieces at all pump suction lines, including servicing of strainers

All valves, including the valves supplied by purchaser, should be cleaned after hydrotest by flushing operation by removing the bonnet and cleaning the seat to remove any particle in the body/seat.

7.2. Sectional Hydrotest

In case hydrotesting is being done in separate small sections vendor shall ensure that the there is a proper arrangement of air relief valves to vent out air during hydrotest.

Sectional hydrotest will be permitted only in exceptional cases and at the discretion of purchaser. Sectional hydrotest should be carried out by vendor only after prior approval from purchaser.

Before commencing of hydrotest , the Vendor should submit hydrotesting methodology document indicating the detailed description of section to be hydrotested and the position of the joints which will not be tested. Any such joints that will not be hydrotested should be left open (in case of encased or buried lines) for final verification.

Hydrotest methodology should be submitted by the vendor for approval.

7.2.1. For hydrotest of underground, buried or pipes to be encased, Vendor to ensure that the backfilling or encasing work is carried out only after the hydrotest is carried out. All accessories required for hydrotest should be arranged by the vendor at no extra cost.

7.2.2. **Hydrotest Failure and Fractured pipes**
Upon failure of hydrotest, the failed joints will have to be rewelded and inspected and the hydrotest has to be repeated and demonstrated to purchaser's personnel at site.

In case the hydrotest has failed owing to a fractured pipe then no repair should be allowed on the fractured pipe. The fractured pipe shall be replaced by the vendor at his own cost.

8. Painting : For details on painting refer painting specification.

9. Spares :

9.1. Recommended Spares : Vendor to submit a list indicating the recommended spares and the necessary quantity.

DATA SHEETS

Tata Power Company Ltd.	LP piping Specification	Data Sheet D1	Corporate Engineering
Rev : 00 date : 11-03-2013	BRANCHING TABLE	DOCUMENT PART 1 OF 1	FIRE PROTECTION SYSTEM

Nominal Line Size (NB)	Tapping Size															
	15	25	40	50	65	80	100	150	200	250	300	350	400	450	500	600
15	T	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
25	RT	T	-	-	-	-	-	-	-	-	-	-	-	-	-	-
40	RT	RT	T	-	-	-	-	-	-	-	-	-	-	-	-	-
50	RT	RT	RT	T	-	-	-	-	-	-	-	-	-	-	--	-
65	RT	RT	RT	RT	T	-	-	-	-	-	-	-	-	-	-	-
80	RT	RT	RT	RT	RT	T	-	-	-	-	-	-	-	-	-	-
100	RT	RT	RT	RT	RT	RT	T	-	-	-	-	-	-	-	-	-
150	RT	RT	RT	RT	RT	RT	RT	T	-	-	-	-	-	-	-	-
200	RT	RT	RT	RT	S	S	RT	RT	T	-	-	-	-	-	-	-
250	RT	RT	RT	RT	S	S	S	S	S	S	-	-	-	-	-	-
300	RT	RT	RT	RT	S	S	S	S	S	S	S	-	-	-	-	-
350	RT	RT	RT	RT	S	S	S	S	S	S	S	S	-	-	-	-
400	RT	RT	RT	RT	S	S	S	S	S	S	S	S	S	-	-	-
450	RT	RT	RT	RT	S	S	S	S	S	S	S	S	S	S	-	-
500	RT	RT	RT	RT	S	S	S	S	S	S	S	S	S	S	S	-
600	RT	RT	RT	RT	S	S	S	S	S	S	S	S	S	S	S	S

LEGEND :

T - T - Joint

RT - Reducing T-Joint

S - Stub in

Note :

a) Requirement of reinforcement pad and area loss compensation for pipe openings to be checked by vendor

b) Reinforcement pad dimensions to be a per ASME 31.1

E

DESIGN	TEMP. º C		50						CORR. ALL. mm			1.5		
	Pressure (kg/ cm^2 g)		8.8 / 10.5						FLANGE FACING			SO FF		
NOM. PIPE SIZE		mm	≤ 150	200	250	300	350	400						
OUTSIDE DIA.		mm		219	273	324	356	406						
THICKNESS		mm	HEAVY CL	6.3	6.3	6.3	6.3	8						
LINE JOINT			≤ 50 – SW welded AS PER ANSI B16.11 (≤ 50 GI PIPE JOINT SHALL BE THREADED JOINT) USE OF HALF COUPLING / STUB JOINT IS NOT ACCEPTABLE ONLY STANDARD TEES ARE ACCEPTABLE FOR LINE TAPPING.											
			≥ 65 - BW TO ANSI B16.25											

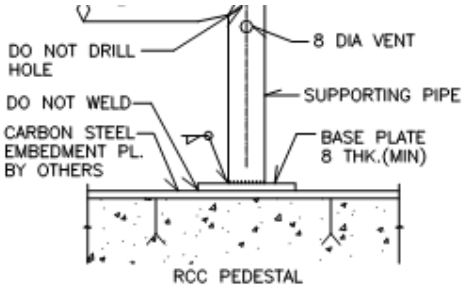
ITEM	NOMINAL PIPE SIZE RANGE (mm)	MATERIAL SPECIFICATION	DIMENSIONAL STANDARD	REMARKS
PIPES	≤ 150	IS 1239 PT.1	IS 1239 PT.1	ERW, BLACK, ≤ 40 - PE, ≥ 50 – BE
	≥ 200	IS 3589 Gr. FE 410	IS 3589	ERW , BLACK, BE
GI PIPE & PIPE FITTINGS	ALL SIZES	AS APPLICABLE ABOVE	AS APPLICABLE ABOVE	GALVANIZED AS PER IS 4736
FITTINGS ELBOWS, CAPS, REDUCERS ,TEES	≤ 50	ASTM A234 Gr. WPB	ANSI B16.9	SCH40, SMLS
	≥ 65	IS 1239 Part II Heavy grade	IS 1239 Part II	
THREADED FITTINGS FOR GI PIPE	ALL Sizes	ASTM A105	ANSI B16.11	3000CL, SMLS, HOT DIP GALVANIZED
FLANGES	≤ 150	ASTM A105	ANSI B 16.5	SO, 150 CL
	200 TO 300	IS 2062 Gr. B	ANSI B 16.5	SO, 150 CL
	≥350	IS 2062 Gr. B	ANSI B 16.5	SO, 150 CL, LIGHT WEIGHT
BLIND FLANGES	≤ 150	ASTM A105	ANSI B 16.5	150 CL
	200 TO 300	IS 2062 Gr. B	ANSI B 16.5	150 CL
	≥350	IS 2062 Gr. B	ANSI B 16.5	150 CL, LIGHT WEIGHT
MACHINE / STUD BOLTS	ALL	IS 1367	IS 1364 CL 4.6	HOT DIP GALVANIZED
HEAVY HEX. NUTS	ALL	IS 1367	IS 1364 CL4	HOT DIP Galvanized
GASKETS	ALL	NITRILE RUBBER	ANSI B16.21 CL150	3mm THICK RING , SELF CENTERING TYPE WITH SHORE HARDNESS 60 A
THREADED FITTINGS for MS Pipe	≤ 50	ASTM A105	ANSI B 16.11	3000 CL, NPT / SMLS

VALVE DATA SHEETS

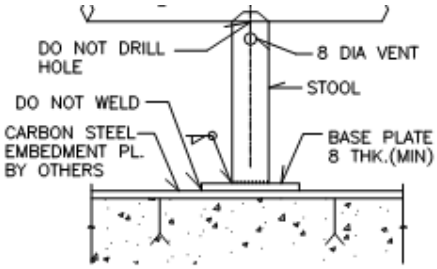
TYPE OF VALVE	SIZE RANGE	MATERIAL		PRESSURE RATING	Design Standard	TYPE OF ENDS	SPECIFICATION OR	REMARKS
	(mm)	BODY	TRIM	ANSI/ IS			TAG NUMBER	
GATE GLOBE CHECK	≤ 40	BRONZE ASTM B62	BRONZE ASTM B62	PN 1.6	GATE – IS 14486 GLOBE – IS 10605 CHECK – IS 10989	NPT/ IS 554 TAPER		
GATE GLOBE CHECK VALVE	≥ 50	Cast steel as per IS 1030	Cast steel	150	GATE – IS 14486 GLOBE – IS 10605 CHECK – IS 10989	FF		MOC shall be as per IS 14846, Table no 1, clause 6, Alternate material for Gate Valve & Check Valve (as per Applicable for cast steel body)
BUTTERFLY VALVE	≥150	CI IS 210 Gr. FG 260	NITRILE	PN 1.6		Flange type		NOT TO BE USED FOR MAIN ISOLATION PURPOSE OR APPLICATIONS WHEREIN SEAT LEAKAGE IS NOT ACCEPTABLE.
Y- TYPE STRAINERS	50 TO 150	IS I239 PART 1	SS 304 SCREEN	ANSI B16.5 150 CLASS		RF		
	200	IS 3589 GRADE FE 410	SS 304 SCREEN	ANSI B16.5 150 CLASS		RF		

STANDARD SUPPORT CONFIGURATIONS

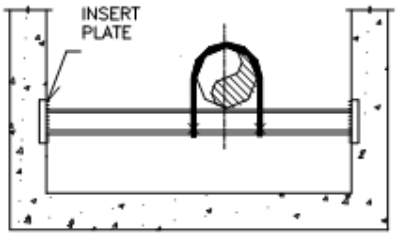
NOTE : STANDARD SUPPORT CONFIGURATION FOR VENDOR'S REFERENCE. ACTUAL SUPPORT TYPES REQUIRED IN THE SPECIFIC PROJECT SUBJECT TO CHANGE DEPENDING ON SITE REQUIREMENT. THE SUPPORT CONFIGURATIONS INDICATED HEREIN REFLECT THE BEST ENGINEERING PRACTICES THAT VENDOR SHALL ADOPT



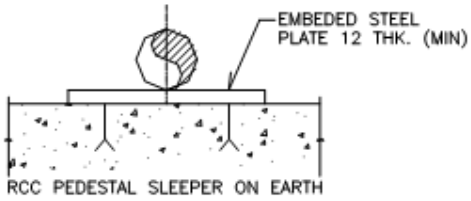
PS–1 SLIDING SUPPORT ON PEDESTALS



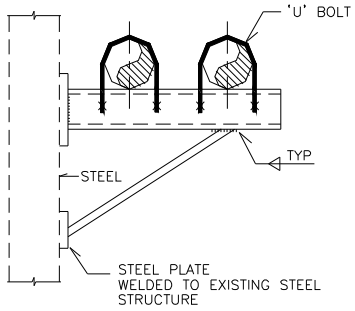
PS–2 SLIDING SUPPORT ON PEDESTALS
(FOR PIPES ON STOOL)



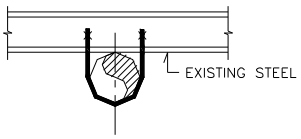
PS–3 PIPE SUPPORT IN TRENCH



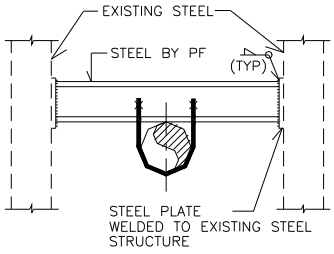
PS–4 PIPE SUPPORTED ON PEDESTALS



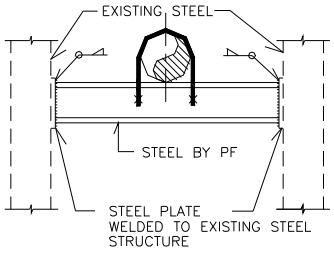
PS–5 PIPE SUPPORT
FROM COLUMNS



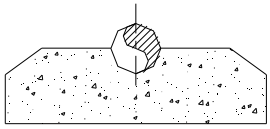
PS–6 PIPE SUPPORT
BY 'U' BOLTS



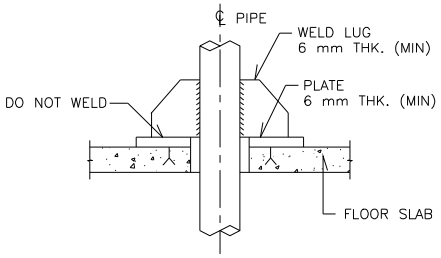
PS–7 PIPE SUPPORT
BY 'U' BOLTS



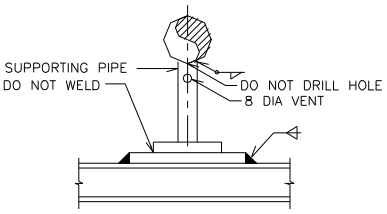
PS–8 PIPE SUPPORT
ON AUX.BEAM



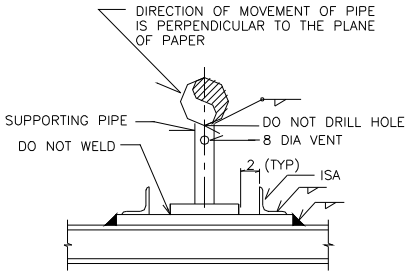
PS–9 PIPE ON CONCRETE BASE



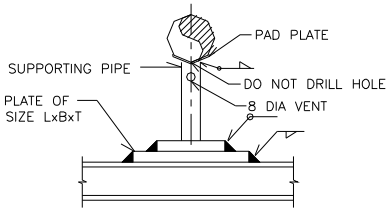
PS–10 SUPPORT FOR VERTICAL PIPE
THROUGH FLOOR OPENING



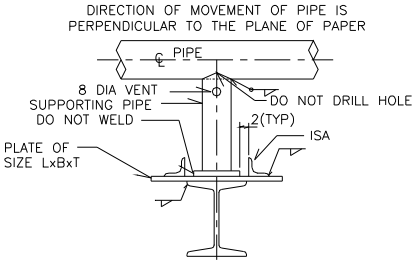
PS–11 SLIDING SUPPORT ON RACK



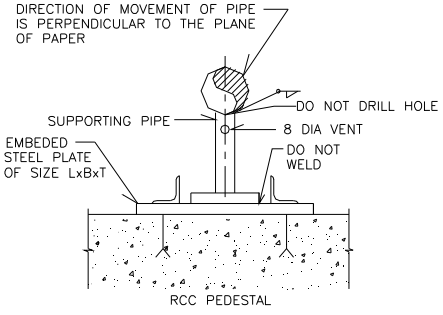
PS–12 GUIDE ON RACK



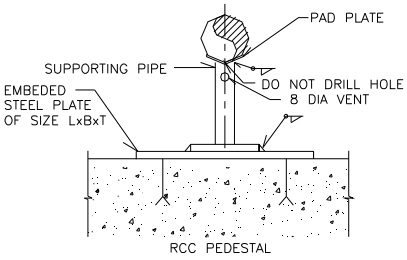
PS–13 ANCHOR ON RACK



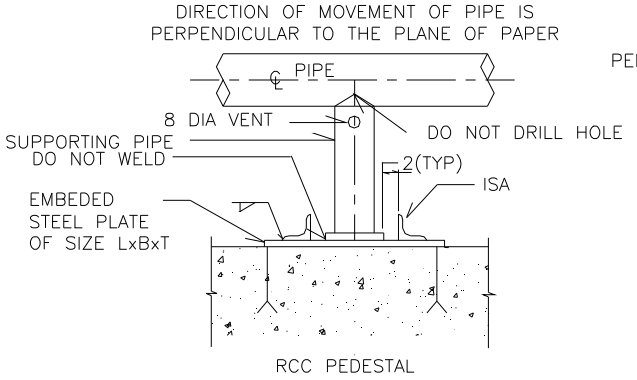
PS–14 RESTRAINT ON RACK



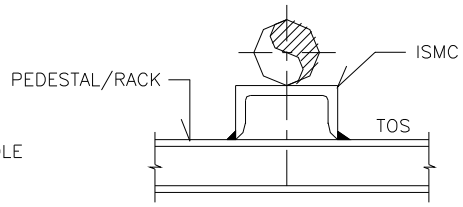
PS–15 GUIDE ON PEDESTAL



PS–16 ANCHOR ON PEDESTAL

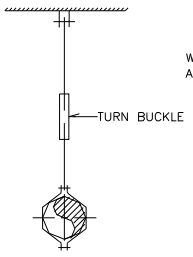


PS–17 RESTRAINT ON PEDESTAL

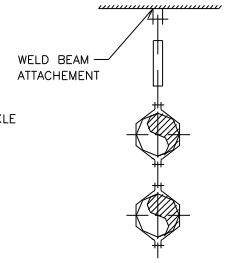


PS–18 SLIDING SUPPORT FOR RUBBER LINED PIPES

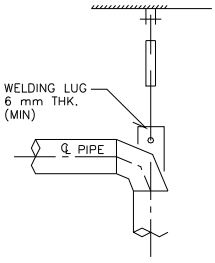
STANDARD PIPE SUPPORT CONFIGURATION



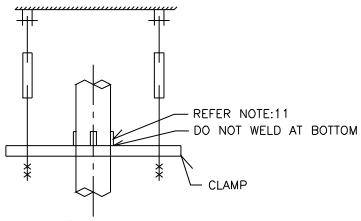
RH–1
SINGLE TIE ROD RIGID
PIPE HANGER
(FOR ONE UNINSULATED PIPE)



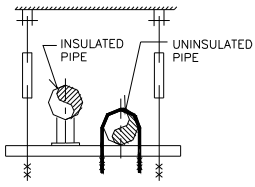
RH–2
RIGID PIPE HANGER
(FOR MORE THAN ONE PIPE ONLY WHEN ONE OF THE PIPES IS ≤ 100 NB)



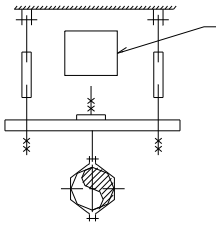
RH–3
SINGLE TIE ROD RIGID
(HANGER FOR ELBOW)



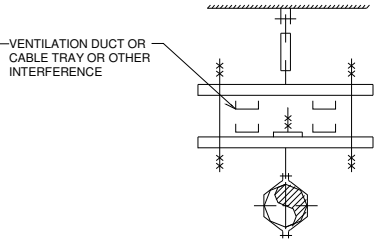
RH–4
DOUBLE TIE ROD RIGID
PIPE HANGER
(FOR VERTICAL PIPE)



RH–5
DOUBLE TIE ROD SINGLE
TRAPEZE RIGID HANGER
(FOR PIPE ABOVE TRAPEZE)



RH–6
DOUBLE TIE ROD SINGLE
TRAPEZE RIGID HANGER



RH–7
SINGLE TIE ROD DOUBLE
TRAPEZE RIGID HANGER

	THE TATA POWER COMPANY LIMITED	

Pipe, Pipe Fittings & its components			
Sl. No.	**Description**	**Material Standard**	**Dimensional Standard**
1.0	**MAKES**		
a	MS/GI Pipes	Jindal (Ghaziabad&Hissar)/ TATA(Jamshedpur up to 150NB)/ MSL/ Surya Roshni(Bahadurgarh up to 350NB)	
b	SS Pipes	Remi, Ratnamani, Choksi	
c	Forged Fittings, S.S Fittings & Flanges	Flash Forge, Gujarat Infra, M.S. Fittings, Tube Products Incorporate, Pipe Fit, Tube turn, EBY Industries, Navkar fittings, Sidharth & Gautam	
2.0	**PIPES NORMALLY FILLED WITH WATER**		
2.1	**M.S. Pipes (Underground / Aboveground)**		
i)	Up to 40 NB	Mild steel, Black ERW to IS: 1239, Part-I, Heavy Grade	IS: 1239, Part-I, Heavy Grade, plain ends for socket welding
ii)	50 NB to150 NB		IS: 1239, Part-I, Heavy Grade, Bevel ends for butt welding
iii)	200NB to350 NB	Mild steel, Black, ERW to IS: 3589, Gr. Fe 410	IS:3589,.6mm Thick, Bevel ends for butt welding, with tolerance as per IS:3589
iv)	400NB	Mild steel, Black, ERW to IS: 3589, Gr. Fe 410	IS:3589,.8mm Thick, Bevel ends for butt welding, with tolerance as per IS:3589
v)	Hydro-test pressure shall be 1.5 times pump shutoff head and holding time shall be 24 Hours.		
2.2	**M.S Fittings (Underground / Aboveground)**		
a)	**Elbow**		
i)	Up to 40 NB	Forged to ASTM A 105	ASME B16.11,SW, #3000
ii)	50 NB to 150NB	ASTM A234,Gr.WPB	ASME B 16.9,SCH40,BW
iii)	200NB to 400NB	Mitre Fabricated from Parent Pipe (4 segments-15°, 30°, 30°, 15°)	ASME, B16.9, BW, Thickness matching with that of parent pipe.
b)	**Tee**		
i)	Up to 40 NB	Forged to ASTM A 105	ASME B16.11, SW, #3000.
ii)	50 NB to 150NB	ASTM A234,Gr.WPB	ASME B 16.9,SCH40,BW.
iii)	200 NB to 300NB	Branching from Parent Pipe	ASME, B16.9, BW, Thickness matching with that of parent pipe.
c)	**Reducer**		
i)	Up to 40 NB	Forged to ASTM A 105	ASME B16.11, SW, #3000.

Sr. No.	Description	Material Standard	Dimensional Standard
ii)	50NB to 150 NB	ASTM A 234,Gr.WPB	ASME B16.9,SCH40, BW
iii)	200NB TO 400NB	Fabricated from parent pipe with included angle 30°	ASME B16.9, BW, Thickness matching with that of parent pipe.
d)	**Half coupling**		
i)	All sizes	Forged to ASTM A 105	ASME B16.11,SW,#3000
2.3	**M.S Flanges**		
a)	Slip-on Flange/ Blind Flange		
i)	Up to 150NB	Forged to ASTM A 105	ASME B16.5, #150, SOFF/RF
ii)	200 NB to 300NB	IS:2062, Gr. E250 A	
iii)	350NB and Above	IS:2062, Gr. E250 A	ANSI B16.5, Class 150#, SOFF/RF, Thickness as per AWWAC207,Class D of Table-2
2.4	**Bolts, Nuts & Washers**		
a)	Bolts	IS-1367	IS-1364 Cl. 4.6
b)	Nuts	IS-1367	IS-1364 Cl. 4.0
c)	Washers	IS-2016, Type-A	
2.5	**Gasket**		
a)	All Sizes	Black Rubber	B16.21, #150, 3mm thickness, Self centering type ,Shore Hardness 60D
3.0	**PIPES NORMALLY EMPTY BUT PERIODICALLY FILLED WITH WATER (SPRAY WATER LINE/ FOAM-WATER SOLUTION LINE)**		
3.1	**G.I. Pipes (Aboveground)**		
i)	Up to 40 NB	MS ERW to IS:1239, Part-I, Galvanized as per IS:4736	IS: 1239, Part-I, Heavy Gr. PE
ii)	50 NB to150 NB		IS: 1239, Part-I, Heavy Gr. Bevel End
iii)	Hydro-test pressure shall be 1.5 times pump shutoff head and holding time shall be 24 Hours.		
3.2	**G.I Fittings (Elbows / Reducers / Tees)**		
i)	Up to 40 NB	Forged to ASTM A 105, Galvanized as per IS:4736	ASME B16.11, Socket weld, #3000
ii)	50 NB to 150NB	ASTM A234,Gr.WPB, Galvanized as per IS:4736	ANSI B16.9, Butt weld, Sch.40, SMLS
3.3	**G.I Flanges**		
i)	Up to 150NB	Forged to ASTM A 105, Galvanized as per IS:4736	ASME B16.5, #150, SOFF.

Sl.No.	Description	Material Standard	Dimensional Standard
3.4	**Bolts, Nuts & Washers**		
a)	Bolts	IS-1367, Galvanized as per IS:4736	IS-1364 Cl. 4.6
b)	Nuts	IS-1367, Galvanized as per IS:4736	IS-1364 Cl. 4.0
c)	Washers	IS-2016, Type-A, Galvanized as per IS:4736	
3.5	**Gasket**		
a)	All Sizes	Black Rubber	B16.21, #150, 3mm thickness, Self centering type ,Shore Hardness 60D
4.0	**FOAM CONCENTRATE LINE**		
4.1	**SS Pipes**		
	Up to 40NB	Stainless steel to ASTM A 312, TP 304, ERW	ASTM A 312, TP 304, Sch.40S, Plain End
a)	Up to 150NB	Stainless steel to ASTM A 312, TP 304, ERW	ASTM A 312, TP 304, Sch.40S, Bevel End
4.2	**SS pipe fitting (Elbows/ Tees/ Reducers)**		
a)	Up to 40 NB	Stainless steel to ASTM A 403, WP304	B16.11 Socket Weld, #3000
b)	50 NB and Above		ANSI B16.9 Bevel End, Sch.40S
4.3	**SS Flanges / Blind Flanges**		
a)	All size	ASTM A -182M	Drilling as per ANSI B16.5, Class 150#,RF/FF
4.4	**SS Bolts, Nuts & Washers**		
a)	Bolts	Material as per ASTM A193 B8	ASME B18.2.1
b)	Nuts	Material as per ASTM A194 Gr.8	ASME B18.2.2
c)	Washers	SS-304	IS-2016, Type-A
4.5	**Gasket**		
a)	All Sizes	Black Rubber	B16.21, #150, 3mm thickness, Self centering type ,Shore Hardness 60D

Section B

Technical Requirement of Fire Protection and Detection System

Chapter No 4

Standard Specification for Hydrant System.

ENGG/ P&L/STD-SPEC/ 006

THE TATA POWER COMPANY LIMITED

STANDARD

TECHNICAL SPECIFICATION

FOR

Fire Hydrant System

DOCUMENT NO - ENGG/ P&L/STD-SPEC/ 006

Tata Power

Generation Engineering

R2	13/05/2024	Issued for use	J Shinde	D Das	N Mishra
R2	15/12/2021	Issued for use	J Shinde	N Mishra	R Gadre
R1	31/03/16	Issued for Info or Use	SP	JSS	SMG
R0	3/7/2014	Issued for Info or Use	JSS	RSG	AJ
Rev. No	**Date**	**Description**	**Prepared By**	**Checked By**	**Approved By**

WorkflowCompleted Printed By: AMAN GUPTA - 31/Jul/2025 - A

Internal - All Employees of Tata Power

Contents

1. **Scope** 3
2. **Codes and Standards** 3
3. **Design Criteria** 3
4. **Lay out Requirements** 4
5. **Pumping System for Hydrant System** 5
6. **Operation of Hydrant system** 8
7. **Fire Extinguisher** 7
8. **Technical Parameter of Equipments covered under Fire Hydrant system** 9
9. **Inspection and Marking Requirements of Fire Hydrant system equipments** 8
10. **Performance Requirement of Hydrant System.** 8
11. **Spares** 10
12. **Data Submission By Bidder** 11

WorkflowCompleted Printed By: AMAN GUPTA - 31/Jul/2025 - A

Internal - All Employees of Tata Power

1. Scope

1.1. Scope of this standard specification covers fire hydrant system (internal and external) for all building, structures, areas for the location as described in Section A.

2. Codes and Standards

2.1. All equipment, system and services covered under this specification shall comply with all currently applicable statutes, regulations, and safety codes. Nothing in this specification shall be construed to relieve the BIDDER of his responsibility

2.2. In the event of any conflict between the codes and the standards referred to elsewhere in the specification and the requirements of this specification, more stringent of the two shall govern.

2.3. Following are some of the important codes and standards relevant to this specification.

IS:3034	Fire Safety of Industrial Building: Electric Generating and Distributing station – Code of Practice
NBC 2017	National Building Code
Life safety Act	Maharashtra Life safety Act 2007
NFPA 1	NFPA Fire Prevention Code
NFPA 14	Standard for the Installation of Standpipes and Hose Systems
NFPA 24	Standard for the Installation of Private Fire Service Mains and Their Appurtenances

3. Design Criteria

3.1. Hydrant system shall be designed as per applicable NBC / NFPA clause.

3.2. Ordinary hazard class shall be considered for designing of Fire hydrant system for Generating plant and current converting station.

3.3. Pump discharge capacity shall be designed as per project specification. Capacity mentioned in the section A is the minimum capacity required for the project. Bidder to analyse the capacity of pump and suggest any improvement needed.

3.4. If Common header system for hydrant & spray / sprinkler system is proposed in section A, then total discharge capacity of main pump shall be as per IS 3034 i.e. 3600 LPM Hose stream for hydrant system plus actual water requirement of fixed Spray system.

3.5. Head of the pump shall so selected that it shall meet combine requirement of Hydrant or spray system. i. e. Pump shall deliver residual pressure of 3.5 bar for spray system at hydraulically remote nozzle and 3.5 bar residual pressure at hydrant valve at hydraulically remote valve plus 10% margin.

WorkflowCompleted Printed By: AMAN GUPTA - 31/Jul/2025 - A

Internal - All Employees of Tata Power

3.6. Size of the hydrant header shall be such that minimum pressure at hydraulically remote nozzle shall meet the design requirement + 20% margin shall be kept for clogged condition. In any case size of the hydrant ring main shall not be less than 150mm.

3.7. Bidder shall clearly mention pump discharge and Head considered in their offer.

3.8. Velocity in the ring main shall not cross 2.8 m/s.

3.9. Pressure drop calculation shall be based on Hazen William constant of C = 100 for all types of pipes.

3.10. All the pipes, pipe fittings, Valves, Pipe support, joining method, shall conform to piping standards specification.

3.11. Underground pipe protection shall be as per standard specification of underground fire Hydrant Pipe Protection.

3.12. Each external Hydrant valve shall be equipped with One no of double headed Hydrant Valve, 2 x 15 Meter RRL Long Hose Pipe, Branch pipe, spanner etc. in FRP hose box.

3.13. Each Internal hydrant valve shall be provided with single headed Hydrant Valve, 2 x 7.5 Meter RRL Hose pipe, Branch Pipe, spanner etc. in FRP hose box.

3.14. All internal hydrants shall be provided with 25 mm diameter 30 m long hose reel as per applicable IS standards

3.15. For tall columns, structure, tower, and equipment having height more than 15-meter, water monitor shall be provided. Location and quantity of water monitor will be decided during detail engineering.

4. Lay out Requirements

4.1. Total nos. of hydrant valves shall be finalized based on the latest plot plan considering 30 m spacing between two external hydrants.

4.2. Internal hydrant shall be provided at every landing platform of each staircase.

4.3. A network of hydrant ring main shall be provided for each building, area, structure.

4.4. Isolation valves shall be provided at every branch connection to facilitate easy maintenance of the hydrant network & ring mains shall be interconnected and water from any side of ring main can flow to other end.

4.5. Tapping shall be taken from the hydrant header for the risers inside various floors of buildings. Each riser pipe feeding the internal hydrants is provided with drain, vents, and isolation valve at ground level.

4.6. All isolation valves shall be rising spindle gate valve. Butterfly valve is not acceptable.

4.7. Orifice plate shall be fitted to each hydrant outlets to limit the residual pressure to within 7 kg/cm2 to enable the operator to hold the branch pipe and nozzle without being subjected to excessive reaction thrust.

WorkflowCompleted Printed By: AMAN GUPTA - 31/Jul/2025 - A

Internal - All Employees of Tata Power

4.8. Each water monitor shall be provided with isolation gate valve.

4.9. Pipe shall run underground/aboveground as per direction of engineer incharge. Engineer incharge decision is final for routing of pipe during site execution. Bidder to take clarification from Tata Power regarding the pipe routing before finalization of order.

4.10. Above ground pipe shall run on the pedestal support as per approved civil drawings.

4.11. All isolating valves in the system shall be kept in 'LOCKED OPEN' condition.

4.12. All accessories required for external and internal hydrants shall be stored in hose boxes located alongside of each hydrant.

4.13. Exact location of hydrants shall be such that they are located nearer to, either a door or window opening of the respective building to enable quick access to interior areas of building and use of minimum hose length.

4.14. Isolation valves shall be provided in the network to enable isolation of any section of the network without affecting the flow in the rest.

4.15. The isolation valves shall be located normally near the loop junctions. Additional valves shall be provided in the segments where the length of the segment exceeds 150m.

4.16. Pipes shall run at least 6 m away from the face of the buildings and open storage areas in case of Ordinary Hazard Occupancies.

4.17. Wall opening, cut-out, floor opening wherever required for installation of hydrant system shall be provided by bidder

4.18. Additional internal hydrants shall be provided on the ground floor of each building.

4.19. Suitable operating platform shall be provided for hydrant valve or water monitor if height of hydrant valve / water monitor must increases beyond 1200mm from local Finish ground level due to plant / equipment layout.

4.20. Four-way Fire Brigade breeching connection shall be provided for each at main entrance gate.

4.21. Four-way Fire Brigade breeching connection shall be provided with flanged type NRV and isolation gate valve.

4.22. Draw out connection shall be provided for the fire water tank.

4.23. Air release valve shall be provided at highest point in the system. Air release valve shall be equipped with isolation gate valve and pressure gauge.

5. Pumping System for Hydrant System

5.1. (Working) Fire water main pumps of Vertical / horizontal centrifugal type with AC electric motor drive, base plate etc., complete with all accessories to deliver required performance of system as per specification shall be provided

5.2. (Standby) Fire water pumps of Vertical / horizontal centrifugal type with diesel engine driven through suitable gear box, base plate etc., complete with all accessories as required. Diesel

engine shall be provided with independent fuel tanks of 6 hrs capacity and independent fuel, cooling, and exhaust system.

5.3. Fire water jockey Pumps of Vertical / horizontal centrifugal type with AC electric motor drive, base plate etc., complete with all accessories as required.

5.4. Pumps shall be full fill requirements specified in standard specification attached with the specification.

5.5. Piping inside the Fire Pump Room shall be designed and arranged in such a way as to allow free movement of personal inside the Fire Pump Room without any obstructions or limitations whatsoever. It shall full fill NFPA 20 requirements.

5.6. Pressure relief valve with isolation valve shall be provided for the delivery header, the relief line discharge routed to the fire water tank or nearest drain or fire water tank as per instruction of engineer incharge.

5.7. Waterproof padlock & GI chains with master key shall be provided for all isolation gate valves inside pump house.

5.8. Grouting shall be provided for the complete gap inside in-between the Pump foundation and base frame. Pump shall be aligned with the motor shaft as per applicable standard.

5.9. The vent arrangement (flame arrestor) for the Diesel Fuel Tank shall be extended outside of the Fire pump room.

5.10. Exhaust pipe of diesel engine shall be suitably routed outside of pump house with proper insulation.

5.11. Operation and control of complete pumping system shall be controlled through motor control panel situated in pump room.

5.12. Control panel shall be interfaced with DCS/SCADA.

5.13. Local push button shall be provided near each pump

5.14. Motor control panel shall be as per standard specification attached with this specification.

5.15. Pressure switch shall be used to sense the pressure in pump discharge line and same shall be used to Auto Start / STOP of the pump via MCC panel.

5.16. Digital indication type flow meter shall be provided for test line.

5.17. Common test line cum recirculation line with isolation gate valve shall be provided on common header. This recirculation valve shall be directed in main fire water tank.

5.18. Additional auto recirculation valve shall be provided on the common discharge header. Size of auto recirculation valve shall be sufficient to discharge water for minimum safe flow of safe flow of the maximum capacity of one pump.

5.19. Level gauge and level switch shall be provided on the fire water tank and same shall be interfaced with panel for water level indication in SCADA.

WorkflowCompleted Printed By: AMAN GUPTA - 31/Jul/2025 - A

Internal - All Employees of Tata Power

6. Operation of Hydrant System

6.1. The Fire water system shall be a pressurized system provided with automatic starting of fire water pumps. The mode of operation of fire water system shall be as follows:

1. If there is nominal pressure drop in the header pressure due to leakage, jockey pump will start and built the pressure up to set point and auto cut off.
2. In the event of fire when hydrant valves/water monitors/deluge valve are opened, the pressure in the header shall drop due to the resultant flow and at a preset low pressure in the header, the motor driven pump shall start automatically by getting an impulse from a pressure switch mounted on the header.
3. In case the motor driven pump, fails to start, the pressure in the mains shall drop further and sequentially start diesel driven pump. There shall be a provision to start the pump manually in case of emergency.

6.2. Stopping of main electrical driven pump and diesel engine driven pumps shall be manual.

6.3. Jockey pumps shall not be running when main pumps are in operation.

6.4. The pressure setting for the pumps shall be such that the all pumps in the fire fighting system shall be automatically start in sequentially manner.

6.5. Critical signal list Signal in fire hydrant system shall be relayed to main fire alarm panel and interfaced with SCADA/ DCS system of station.

7. Fire Extinguisher

7.1. Fire Extinguisher shall be provided through out the premises as per NBC and NFPA Guidelines.

7.2. For electrical equipments, it would be necessary to provide extinguishers as under

- For rooms containing electrical transformers, switchgears, motors and/or electrical apparatus only, not less than two 2 Kg dry powder or carbon dioxide type of extinguishers shall be provided within 15 m of the apparatus.
- Where motors and/or other electrical equipments are installed in rooms other than those containing such equipments only, one 5 Kg dry powder or carbon di oxide extinguisher shall be installed within 15 m of such equipments

7.3. The extinguisher locations are decided based on following considerations and shall confirm IS 2190 and NFPA 10 requirements.

- Travel distance of 15 meters maximum
- Uniform distribution,
- Easy accessibility,
- Nearness to doors, windows, and emergency doors,
- Access and escape route, Safe distance from application area.

7.4. Four nos. of bucket with stand arrangement filled with clear sand shall be provided.

8. Technical Parameter of Equipment's covered under Fire Hydrant system

8.1. Hydrant Valve shall be as per IS 5290 Type A, Oblique type outlet angled toward ground. MOC shall be SS 316.

8.2. Water Monitor shall be as per IS 8442, having nozzle size 32 mm, SS 316 Material shall be used for Nozzle. Performance testing shall be carried out as per IS 8442 before delivering to site. Test will be witnessed by purchaser.

8.3. Hose pipe shall be as per IS 636 Type B, proof pressure shall be conducted along with coupling assembled with hose as per IS 636.

8.4. Hose coupling shall be as per IS 903, shall have SS316 MOC.

8.5. Branch Pipe shall be as per IS 903, shall have SS 316 MOC. Branch pipe shall also provide with spanner.

8.6. Hose reel shall be as per IS 884.

8.7. Portable Fire Extinguisher – Water type shall be as per IS 940.

8.8. Portable fire extinguisher – DCP type shall be as per IS 2171.

8.9. Fire Bucket and its stand shall confirm IS 2546.

8.10. Co2 Type fire extinguisher shall confirm IS 2878.

9. Inspection and Marking Requirements of Fire Hydrant system equipments

9.1. TATA POWER or its authorized representative shall have access at all reasonable times to the manufacturer's works, where the equipments of Fire Hydrant system are being manufactured and/or tested. Any defect / shortcomings pointed out shall be rectified to the satisfaction of inspectors.

9.2. Tata Power will inspect the any or all material at any stage of manufacturing as per approved Manufacturer quality assurance plan. Bidder is responsible for getting approval of all documents before proceeding further.

9.3. Bidder to refer minimum Inspection Requirement of various equipments attached with this specification ENGG/ P&L/STD-SPEC/ 012.

10. Performance Requirement of Hydrant System.

10.1. General Requirement of PG Test.

10.1.1. Test shall be conducted by representatives of the contractor and the Employer. The contractor shall be given permission to inspect the entire system in advance and make it ready for the test. Contractor's representatives shall witness all phases of the test and record the data jointly with the Employer's representatives.

10.1.2. The responsibility for conducting the test rests with the contractor.

10.1.3. Any instruments required for the PG test will be provided by the contractor. Calibration of test instruments shall be the responsibility of the contractor.

10.1.4. Replacement of fused/damage parts, i.e., quartzoid bulb and linear heat sensing cable etc., during the test shall be the responsibility of contractor.

10.1.5. Provision shall be made for the disposal of water issuing from outlets to avoid property damage.

WorkflowCompleted Printed By: AMAN GUPTA - 31/Jul/2025 - A

Internal - All Employees of Tata Power

10.1.6. Contractor should furnish a written statement to the effect that the work covered in this contract has been completed and all specified flushing of underground, above ground piping has been successfully completed together with specified hydrostatic pressure tests.

10.1.7. All the erection/commissioning protocols in respect of hydro test of hydrant mains, spray lines, vibration/noise level data of pumps, holiday test results of pipe coating, IR/conductor resistance values of LHS cables, alarm/annunciation/control systems, batteries, pipe line flushing, laying of pipelines as per TAC accredited professional(s) approved drawings, compliance of all hand appliances and their accessories as well as all components of hydrant/ spray/ other protective equipments to BIS; all other systems/equipments shall be made available before conducting the P. G. Test. Sample checking of all the above mentioned items shall be carried out during P. G. Test.

10.2. Hydrant System.

10.2.1. Sequential auto start of the electric and diesel hydrant pumps shall be checked by opening the test hydrants.

10.2.2. The minimum running pressure of 3.5 Kg/sq. cm at the farthest/hydraulically most remote hydrant point shall be available with half the aggregate pumping capacity being discharged at the test point and half en-route.

10.2.3. Minimum running pressure of 3.5 Kg/ sq. cm at the highest/ farthest (hydraulically remotest hydrant point) shall be demonstrated with only one diesel hydrant pump running with half the aggregate pumping capacity being discharged at the test point and half en-route.

10.2.4. This test shall be repeated every month during guarantee period in the presence of contractor's representative.

10.2.5. Auto operation of jockey pump for pressurizing of the system shall be checked for eight hours and reading of actuating/cut off pressures shall be recorded.

10.2.6. Control panel/annunciation panel shall be checked for operation i.e., proper functioning and audiovisual indications as spelt out in system functional requirements of Fire Detection & alarm system.

10.2.7. Battery and battery charger shall be checked for auto charging and providing sufficient power for eleven consequent starting kicks each of 10 sec. duration to diesel engine (with diesel supply cut off) within five minutes with A.C. supply switched off. It shall be able to start the diesel engine in the 12th starting kick.

10.2.8. The hydrant mains shall be hydraulically tested and shall be capable of withstanding for 30 minutes a pressure equivalent to 150% of the design pressure or 200% of maximum operating pressure, whichever is higher. In case this test has been conducted before commissioning, such test is not mandatory, and protocols shall be verified.

10.2.9. All the hydrant valves, isolating valves and valves of monitors shall be operated repeatedly for smooth operation and there shall be no leakages / passing.

10.2.10. For diesel engine pump sets, six (06) hour full load test and 10% overload run test for 1 hour shall be carried out. Performance of diesel engine shall be observed at the end of the above test.

10.2.11. Vibration and noise level measurement shall also be taken at full load and at overload run test and shall be below the specified value indicated in approved data sheet. Vibration level of electric motor driven

WorkflowCompleted Printed By: AMAN GUPTA - 31/Jul/2025 - A

Internal - All Employees of Tata Power

pumps, their motors and diesel engine driven pumps shall be 75 micron and noise level less than 85 dB. Vibration and noise level for diesel engines shall be 15mm/sec rms and 85 dB at 1.5 m above floor and 1.0M from the equipments. Suitable acoustic enclosures shall be provided to limit the specified noise level for diesel engines.

10.2.12. Following readings shall be taken after every half an hour and shall be compared with the specified values indicated in the approved data sheet.

a) Exhaust temp. (with engine mounted calibrated temp. gauge).
b) Closed circuit water temp. (with engine routed calibrated temp. gauge.
c) Lubricating oil temp. (with engine mounted calibrated temp. gauge).
d) Lubricated oil pressure (with engine mounted calibrated pressure gauge).
e) Speed (with digital non-contact RPM meter).

Efficiency of combustion shall be verified from the colour of the exhaust. The colour of exhaust shall be haze clear and not black.

11. Spares

11.1. Bidder to provide following spares for the Fire Hydrant System.

1.0	**FIRE HOSES WITH COUPLINGS**		
1.1	7.5m long fire hoses with end connectors	5% of Total population	
1.2	15m long fire hoses with end connectors	5% of Total population	
2.0	**BRANCH PIPES WITH NOZZLES**		
2.1	Nozzles with branch pipes & quick coupling ends	5% of Total population	
3.0	Gate Valve of each size used	Nos	1
4.0	Butterfly Valve of each size used	Nos	1
5.0	Non-Return Valve of each size used	Nos	1
6.0	Y – Type Strainer of each size used	Nos	1
7.0	Hydrant Valve of each type used	10% of Total population	
8.0	Water Monitor of each type used	1 Nos	
9.0	**PORTABLE EXTINGUISHERS**		
9.1	Pressurised Water type (9 lit. cap.)	Nos	2
9.2	Foam Type (9 lit. cap.)	Nos	2
9.3	CO2 Type (4.5 kg cap.)	Nos	2
9.4	Dry Chemical Type (ABC type, 6 kg cap.)	Nos	4
10.0	**MOBILE EXTINGUISHERS**		
10.1	Foam type (50 lit. cap.)	Nos	1
10.2	CO2 Type (22.5 kg cap.)	Nos	1
10.3	Dry Chemical Type (ABC type, 50 kg cap.)	Nos	1

Bidder to also provide list of recommended spares for next three years of operation.

12. Data Submission by Bidder

12.1. Bidder shall furnish drawings and data sheet below listed equipments for information along with the Offer.

i. Technical Data sheets and Product catalogue of the pipes, pipe fittings, Hydrant Valve, Water Monitor, Main Pump, Jockey Pump. Electrical Motor, Diesel Engine, Motor control panel, PLC panel, Fire extinguisher.

ii. Electrical Load list

iii. Technical data sheet and product catalogue of Solenoid valve, Pressure switch & pressure Gauge.

iv. General arrangement drawing of pump house.

12.2. Drawing document to be submitted by bidder after award of Contract

v. Technical Data Sheets of all listed equipments covered under Fire Hydrant System

vi. Layout drawing of the complete system

vii. Hydraulic Calculation of the network.

viii. P&ID of complete system

ix. GA drawing of Pump house.

x. GA drawing of MCC panel & PLC panel.

xi. QAP / MQP of each equipments

xii. PG test procedure

xiii. O&M manual.

Note: - Above listed document list is indicative only. Bidder to provide each detail asked by Purchaser of any equipments covered in the overall project specification scope.

WorkflowCompleted Printed By: AMAN GUPTA - 31/Jul/2025 - A

Internal - All Employees of Tata Power

Section B

Technical Requirement of Fire Protection and Detection System

Chapter No 5

Standard Specification for Under Ground Pipe.

ENGG/ P&L/STD-SPEC/ 007

THE TATA POWER COMPANY LIMITED

STANDARD

TECHNICAL SPECIFICATION

FOR

Under Ground Fire Hydrant Pipe Protection

(DOCUMENT NO - ENGG/ P&L/STD-SPEC/ 007)

Tata Power

Generation Engineering

R2	13/05/2024	Revised and issued for use	J Shinde	D Das	N Mishra
R1	22/12/2021	Revised and issued for use	J Shinde	N Mishra	R Gadre
R0	6/7/2014	Issued for Info or Use	JSS	RSG	AJ
Rev. No	**Date**	**Description**	**Prepared By**	**Checked By**	**Approved By**

1. **SCOPE**

1.1. Scope of this specification cover corrosion protection for all pipes and structure in the project.

2. GENERAL

2.1. The coating shall consist of coal-tar enamel, inner wrap of fibre glass, final outer wrap of enamel-impregnated fibre or enamel-impregnated kraft paper. The primer and the enamel shall be from the same supplier.

2.2. Ready-made tapes available for underground protection shall be used.

2.3. Tape shall be of approved make.

2.4. The CONTRACTOR shall furnish all the technical information, experience details etc. of the tapes proposed to be used for review.

2.5. The two ends of each length of pipe shall be left bare of primer coating and wrapping for 150 mm from the end to facilitate field welding and subsequent field coating or wrapping.

2.6. The supply, application, characteristics of materials and testing requirements shall be strictly as per IS 10221.

2.7. Type of coating system based upon the soil resistivity may be selected on the following basis:

Soil Resistivity	Corrosivity	Coal tar Coating	Wrapping tapes
≤ 1000 ohm-cm	Extremely corrosive	3 coats and 3 wraps	3 layers of tape
> 1000 ohm-cm	Extremely corrosive	2 coats and 2 wraps	2 layers of tape

3. SURFACE PREPARATION

3.1. Pipe / structural surfaces to be provided with underground protection shall be cleaned by shot or sand blasting.

3.2. The cleaning shall be so carried out that the piping surface is free from mill scale, rust, oil, welding scale and other foreign materials.

3.3. Primer shall be applied immediately after shot or sand blasting to prevent rust forming.

3.4. Superficial rust formed shall be removed by wire brushing or using emery paper.

3.5. If the rust formation is heavy, re-blasting may be necessary.

3.6. Around field joints, the pipe surfaces may be cleaned by wire brushing prior to the application of anti-corrosive protection.

4. PRIMER COAT

4.1. The primer shall be compatible with the grade of enamel used.

4.2. It shall be thoroughly mixed before using by stirring or by rocking the drum to provide uniformity of material.

4.3. The primer coat shall be applied over a thoroughly clean and dry surface within three (3) hours of the cleaning operation and shall be applied preferably immediately with a uniform thickness on the entire surface of the piping using appropriate quantity per unit area of surface as recommended by the manufacturer.

4.4. The primer coating shall be free of bubbles, globules, drips and runs.

4.5. Pipes having a longitudinal seam shall be carefully examined to determine that all excess primer has been brushed out of each side of the welding seam.

4.6. The primer shall be thoroughly dry before the enamel is applied.

4.7. If ready-made tapes are used, then primer, as suggested by the manufacturer, shall be used.

4.8. Freshly primed pipe shall be handled carefully to prevent damage. The damaged area shall be re-primed before applying enamel/wrapping tapes.

5. ENAMEL AND WRAPPING MATERIALS FOR COAL TAR ENAMEL APPLICATION

5.1. The material to be used for coating and wrapping shall be coal-tar enamel, fibre glass inner wrap, fibre glass or kraft paper outer wrap, all as per IS 10221.

5.2. Well-experienced personnel shall be placed in charge of coating and wrapping operations. They shall strictly follow the manufacturer's instructions regarding recommended temperature in the heating kettles and the temperature at which the hot coating is applied to the pipe.

5.3. Clean dry enamel in lumps not exceeding 35 kg in weight shall be heated slowly in clean kettles to the recommended temperature, and after reaching the required temperature, the heating flame shall be controlled to prevent over-heating.

5.4. Any enamel heated more than manufacturer's specifications shall be discarded. Only batch heating of enamel shall be permitted.

5.5. Kettles shall be completely emptied of one batch and cleaned, if necessary, before preparing the next batch of enamel. The enamel shall be stirred continuously with metal agitators.

5.6. Enamel kettles shall be equipped with indicating or recording thermometers having temperature range from 100 to 350°C. Enamel withdrawn from the kettles shall be strained through a 1.5 mm strainer.

5.7. Along with the first coat of enamel, a single spiral inner wrap of fibre glass shall be applied overlapping at least 20 mm on pipes up to 250 mm diameter and 25 mm on larger diameter pipes. It shall be ensured that fibre glass impregnates in the first coat.

5.8. The second coat of enamel and the second outer wrap of enamel-impregnated fibre glass or enamel-impregnated kraft paper shall be applied in the same way and shall conform IS 10221.

5.9. The total thickness of the coating shall not be less than 2.5 mm.

5.10. A third coat of enamel and wrapping shall be applied wherever soil resistivity is below 1000 ohm-cm (extremely corrosive).

5.11. During cold weather, when the pipe surface temperature is below 7°C or during rainy and foggy weather when moisture tends to collect on the cold pipe, enamelling shall be preceded by warming of the primed pipe. Warming shall be done by any method that will heat the pipe uniformly to the recommended temperature without damage to the primer. Temperature of the pipe shall not exceed 70°C.

5.12. Each end of the pipe left bare for welding purpose shall be hand-coated and wrapped after completion of field welding and satisfactory hydrotesting of pipe.

6. APPLICATIONN OF WRAPPING TAPES

6.1. After the surface preparation as per para 3.0, the primer shall be applied by brush or spay to give a coating thickness is between 2 and 4 mils when wet.

6.2. The primer shall be allowed to dry to the touch prior to tape application. Primer and tape shall be furnished by the same manufacturer. If application is done in cold weather, the surface of the pipe shall be preheated until it is warm to the touch, and until all traces of moisture are removed and then the primer shall be applied and allowed to dry.

Internal - All Employees of Tata Power

6.3. The tape shall be wrapped strictly in accordance with the manufacturer's recommendations in a manner that shall meet the adhesion and holiday detection requirements of IS 10221. There shall be a minimum overlap of 12 mm per single wrap. Each layer of tape shall be of 2 mm thickness.

7. TESTING

7.1. THICKNESS

7.1.1. The thickness of the pipe coating shall be measured as per approved field quality plan.

7.2. BOND

7.2.1. Bond test shall be carried out by cutting 25 mm square at three locations of the coating on a sample test specimen to qualify the procedure. Coating shall be pulled out by lifting one corner of the square. For a good coating, the section shall not peel off easily.

7.2.2. The coating on the pipe shall be carried out only after satisfactory completion of the qualifying test.

7.2.3. In case of doubt regarding the quality of coating, bond test shall be carried out on any location of the pipe to the satisfaction of the PURCHASER. The tests indicated under clauses 7.1 and 7.2 are applicable for coal tar enamel applications only.

7.3. FIELD ADHESION TEST FOR WRAPPING TAPES

7.3.1. Adhesion test shall be made to determine the proper bond between the tape and primed pipe. The temperature of the tape and pipe to be tested shall be between 10 and 27 °C. If the temperature is outside this range, hot or cold water shall be poured over the test area until this temperature range is attained. A test area shall be selected by the inspector where the tape is smooth for 15 cm in the longitudinal direction of the tape. Two knife cuts that are 15 cm long and 5 cm apart shall be made through the tape. A flat blade shall be used to pry up 5 cm of the fabric. This 5 cm flap of fabric shall be grasped firmly in one hand and shall be pulled with a quick motion in the direction of the remaining 10 cm of the 15 cm knife cut.

7.3.2. The adhesion is satisfactory if the tape tears at the point of stripping or the fabric strips from the underlying coal tar component, leaving exposed not more than 10% of the primer or metal.

7.4. HOLIDAY TEST

7.4.1. On completion of coating/wrapping, the quality of the coating shall be tested using efficient high voltage holiday detectors, operating at a voltage high enough to jump an air gap, the length of which is equal to the thickness of the coating/wrapping. All holidays found shall be repaired and the repairs shall be retested with the holiday detector to ensure that adequate repairs have been made.

7.4.2. The suggested test voltage shall be as follows:

V = 1250 (t)½ where
V = voltage, in volts
t = coating thickness in mils (1 mil = 0.001 in.)

8. CERTIFICATES

The CONTRACTOR shall furnish certificates of all the materials purchased by him and complete instructions from the manufacturer regarding the storage, preparation, and application of the coating materials.

Section B

Technical Requirement of Fire Protection and Detection System

Chapter No 6

Standard Specification for Pump.

ENGG/ P&L/STD-SPEC/ 008

THE TATA POWER COMPANY LIMITED

STANDARD

TECHNICAL SPECIFICATION

FOR

Vertical Pumps

(DOCUMENT NO - ENGG/ P&L/STD-SPEC/ 011)

Tata Power

Project Engineering

R1	14/05/2022	Issued For Use	MP	DD	NKM
P0	05/02/2015	Issued For Use	MP	NKM	AJ
Rev. No	**Date**	**Description**	**Prepared By**	**Checked By**	**Approved By**

Contents

1. SCOPE 3
2. CODES AND STANDARDS 3
3. EQUIPMENT TECHNICAL SPECIFICATIONS 3
4. PERFORMANCE AND GUARANTEE TESTS 9
5. TESTS AND INSPECTION 9
6. SPARES 12
7. PAINTING 13
8. LAYOUT AND MENTAINENANCE REQUIREMENTS 14
9. DATA & DOCUMENTS TO BE FURNISHED BY BIDDER ALONG WITH BID 15
10. DATA & DOCUMENTS TO BE FURNISHED BY BIDDER POST AWARD OF CONTRACT 15

DATASHEET A - *to be completed by package engineer before issuing specification*

DATASHEETS B - *to be filled by Bidder / Vendor*

1.0 SCOPE

1.1 This Specification covers the requirements of design, construction features, inspection and performance testing of Vertical pumps.

1.2 The scope of the bidder covers the design, manufacture, inspection, testing at Bidder's and/or his Sub-Vendor's works, packing, transportation from place of manufacture to site, unloading at site, erection/supervision of erection (as mentioned in main specification) and commissioning and carrying out performance guarantee test of each equipment and system at Site.

1.3 This specification shall be referred only for general purpose pumps and not for special purpose/category pumps like. BFP, CEP, CW, etc.

2.0 CODES AND STANDARDS

2.1 The design, material, construction, manufacture, inspection, testing and performance of Vertical Pumps shall comply with ISO 5199, IS 1710 & HIS 14.6 latest editions. Nothing in these Specifications shall be construed to relieve the BIDDER of this responsibility.

3.0 EQUIPMENT TECHNICAL SPECIFICATIONS

3.1 For pump duty parameters and project specific technical particulars of pumps, refer Datasheet A.

3.2 Design Features of Pumps- Vertical Pumps

3.2.1 Type of pump-

Pump shall be Vertical turbine type / Vertical Centrifugal pump (Sump pump) as mentioned in Datasheet A. Pump shall be non-clog type.

Vertical Turbine type pump shall be complete with bowl, column and head assembly. Vertical Centrifugal pump shall be complete with volute casing, enclosed shaft and discharge pipe assembly.

Pump shall also consist of line shaft bearings, impeller end bearing, thrust bearing, sealing & cooling arrangement.

Matching counter flange shall also be provided by Pump vendor.

3.2.2 Performance Curve-

Pumps shall have continuously rising head characteristic from its operating point towards shut off without any zone of instability and power capacity characteristic shall be preferably non-overloading type. All pumps shall be capable of being operated to give satisfactory performance at any point on H-Q characteristic curve over a range

from zero flow (shut-off head) up to 130% of the design flow or a flow corresponding to 75% of the design total head, whichever is higher.

All the curves shall be provided for actual, minimum and maximum impeller diameters.

If a pump is required to operate in parallel, curves for single pump operation and all pumps in operation shall also be provided. These curves should be drawn with respect to predicted system resistance curve and the single pump operation point on curve should have atleast 15 % margin on flow from run out point.

Fire water pump shall provide not less than 150% of the rated capacity at a total head of not less than 65% of the total rated head.

3.2.3 Pump shall be selected such that best efficiency point shall be nearer to duty point.

3.2.4 Minimum continuous safe flow –
Minimum flow though the pumps for continuous safe operation shall be the maximum 25% of the rated capacity. If any of the pumps selected by bidder have minimum safe operating flow through pumps more than minimum system requirement, a recirculation line with auto valve (MOV) on recirculation line shall be provided. Auto valve shall be sized to ensure minimum safe flow through pump and shall actuate sensing flow through headers. Refer attached tender purpose schematic for recirculation scheme for reference. Bidder to design the system considering all operational aspects during detail engineering.

3.2.5 Shut off head –
The shut-off head developed by pumps shall be minimum of 110% of the rated head and for fire water pumps it shall not exceed 140% with a minimum of 110% of the total head.

3.2.6 Rated speed-
The rated speed of pumps shall not exceed 1500 rpm unless until specified in Datasheet A.

3.2.7 Critical speed-
The critical speed of the pumps shall not be less than 120% of the normal operating speed of the pump.

3.2.8 Noise level –
Noise level of the motor driven pump set shall not exceed 85 dB respectively at a distance of 1 m from outline of pump set. Noise level of the diesel engine driven pump set shall not exceed 105 dB respectively at a distance of 1 m from outline of pump set.

3.2.9 Vibrations –
Unfiltered vibration of the motor driven pumpset shall be as per Category 1 zone A & B of ISO 10816-7. Unfiltered vibration of the Diesel engine driven pumpset shall not exceed 7 mm/s at pump side and 11 mm/s at engine side in coupled condition.
For engine driven pump, if Vendor is not able to meet these mentioned vibration limit requirements, Vendor shall mention their guaranteed vibration levels in their offer and confirm in the offer that, their selected complete pumpset design is suitable for their guaranteed vibration limits.

3.2.10 Reverse rotation –
Pump shall be suitable for withstanding reverse rotation due to back-flow of water in case of NRV failure without mechanical damage to any component of the pump.

3.2.11 In view of provision of expansion joint on pump discharge line, pumps discharge elbow is likely to experience a back thrust, particularly under shut-off condition, the pump support and foundation bolts shall be designed to take care of this thrust.

3.2.12 Driver rating-
Driver rating shall be selected as per motor standard specifications. However, it should be sufficient to drive the pump with the impeller furnished through the entire range of run-off flow to shut-off conditions considering the variation in frequency.

3.2.13 The corrosion allowance for pressure parts shall be 3 mm.

3.2.14 Margins:

a. Selected pump flowrate shall have minimum 5% margin on required flowrate parameter, unless any stringent requirements are mentioned in main project specification.
b. Selected pump total differential head shall have minimum 15% margin on frictional losses and 5% margin on calculated total differential head (with minimum value of 4m margin for low head pumps), unless any stringent requirements are mentioned in main project specification.

3.3 Features of Construction of Pumps

3.3.1 Bidder shall consider water quality for pump design.

3.3.2 The hardness of impeller ring shall be 50 BHN higher than that of casing ring.

3.3.3 Bearing shall be oil-lubricated or grease-lubricated and shall have a life of 40,000 hours of working. In case of oil-lubricated bearing, constant oil leveler with drain plug shall be provided.

3.3.4 Replaceable shaft sleeves shall be provided to protect the shaft where it passes through seals.

3.3.5 The impeller adjustment shall be such that the impellers run free in any installed condition despite extension of line shaft (caused by hydraulic down thrust) the weight of shafting and weight of impellers.

3.3.6 All incidental piping and valves required for sealing, lubrication and cooling for seals and/or bearing of pump shall be furnished by the Bidder.

3.3.7 Leakage from the pump shall be led to the nearest surface drain. Necessary arrangement like drip tray, base plate drain connection etc. shall be provided by Bidder.

3.3.8 Pump Column — the column for a pump shall be furnished in sections not exceeding a nominal length of 3 m. The line shaft bearings shall be supported from the column pipes. Column pipe shall be connected by threaded sleeve type couplings.

3.3.9 Impeller - Impeller shall be statically and dynamically balanced and securely fastened to the impeller shaft. If open/semi-open impeller is offered, the pump shall be designed to take care of the additional thrust produced.

3.3.10 Impeller Shafts – The maximum permissible error in the axial alignment of the thread axis with the axis of the shaft shall be 0.05 mm in 150 mm.

3.3.11 Line shafts - The shaft shall be furnished with interchangeable sections.

3.3.12 Line Shaft Couplings – The line shaft sections shall be connected by a threaded coupling or a muff or a sleeve coupling. Couplings shall be designed with a safety factor of 1.5 times the shaft safety factor. Self-water lubricated line shaft bearings shall consist of cutlass rubber molded in corrosion resistant SS shells.

3.3.13 The table below provides the minimum recommended MOC for major pump components for general applications. However, Bidder shall ascertain their selected MOC is suitable for the intended service application.

Component	Type of service		
	River / Dam water	**Sea Water**	**Effluent water**
Column pipe	MS ERW (Epoxy painted)	SS316L with corrosion resistant coating	MS ERW (Epoxy painted)
Casing (in case of sump pump)	CI IS 210 FG 260	ASTM A351 SS 316L (with corrosion resistant coating)	CI IS 210 FG 260
Impeller	ASTM A351 SS 316	ASTM A890 Super Duplex SS	ASTM A351 SS 316
Line Shaft / Shaft coupling / shaft enclosing tube if required	ASTM A276 SS 410 Annealed	SuperDuplex SS Annealed	ASTM A276 SS 410 Annealed
Shaft Sleeve	ASTM A276 SS 410 Hardened	SuperDuplex SS Hardened	ASTM A351 SS 316 Hardened
Base plate	MS IS-2062	MS IS-2062 (Epoxy painted)	MS IS-2062
Gland packing	PTFE / PTFE-Graphite braided / Non asbestos graphite	PTFE / PTFE-Graphite braided / Non asbestos graphite	PTFE / PTFE-Graphite braided / Non asbestos graphite
Fasteners	SS 304 (in contact with water) CS – Zinc plated (not in contact water)	SS 316L (in contact with water) CS – Zinc plated (not in contact water)	SS 304 (in contact with water) CS – Zinc plated (not in contact water)

3.4 **General Requirements**

3.4.1 The specified pump shall be supplied with the following items with but not limited to the following:

3.4.2 Driver and Local PB stations
3.4.3 Base plate, Lifting lug, eye bolts, foundation bolts, anchor bolts as applicable.
3.4.4 Companion flange for pump suction and discharge complete with associated bolts, nuts and gaskets.
3.4.5 Junction boxes for terminating instruments along with the interconnecting cables and power cables.
3.4.6 Discharge pressure gauges.
3.4.7 Any I&C item/equipment not specified but necessary for the pumping system to meet the functionality requirements of the Pumps.
3.4.8 Mandatory Spares as specified in herein, start-up / commissioning spares and maintenance and erection tools and tackles required for erection, commissioning and maintenance of the pump sets. These shall include tools required for removal of impeller and coupling and precision tools for alignment and jacking operations. Price of these items shall be indicated in the respective schedules.
3.4.9 Recommended spare parts (list of recommended spares along with prices shall be furnished separately).
3.4.10 Foundation Drawings for pumps and equipments
3.4.11 Static and Dynamic Load data
3.4.12 Forces and moments shall be mentioned in pump GA drawing

3.5 Marking

3.5.1 Each pump shall be provided with a name plate of suitable size and made of corrosion resistant metal, securely attached to the pump and visible after installation.
3.5.2 For all pumps, the nameplate shall include the following information:
a) Manufacturer's name or identifying mark
b) Rated discharge
c) Rated speed
d) Model or type designation
e) Serial number
f) Rated head
g) Number of stages
h) Maximum brake horse power required at rated speed at any discharge condition, and
i) Impeller diameter
3.5.3 The discharge head shall have an arrow indicating the direction of rotation of shaft.

4.0 PERFORMANCE AND GUARANTEE TESTS

4.1 Performance testing of pumps shall be done as per HIS 14.6. Performance parameters within expected operating range of pump shall be guaranteed by the BIDDER as per HIS 14.6 Gr. 1E, with no negative tolerance on flow and head.

4.2 Performance test of pump shall be carried out at rated speed with job motor/engine and gearbox, as applicable for the selected pump model.

4.3 Performance testing of full size pump to establish head, capacity and power consumption at manufacturer works shall be conducted. Fuel consumption in case of diesel engine driven pumps shall be checked.

4.4 Noise, vibration and bearing temperature shall also be measured and guaranteed at all test points throughout operating range of pump as well as from shut off to run off flowrates. Vibration shall be measured in X-Y-Z directions.

4.5 Bidder shall fill the guarantee schedule, and meet the guarantee requirements if applicable. Guarantees mentioned by Bidder in Guarantee schedule shall be inclusive of all tolerances including measurement uncertainties.

4.6 If Pump Vendor fails to meet any of the performance parameters, Pump or any portion thereof is liable for rejection.

5.0 TESTS AND INSPECTION

Hydro test pressure on casing shall be 1.5 times maximum discharge head or twice differential head whichever is higher. (Maximum discharge head = shut-off head ± maximum suction head). Unless otherwise stated in data sheet A, the hydrostatic tests on the casing shall be conducted for a minimum duration of 30 minutes.

Please refer Attachment-1 for minimum inspection requirements for Vertical Pumps.

6.0 SPARES

6.1 The Bidder shall include in his scope of supply, all the necessary Start-up spares. Bidder shall also quote separately for Mandatory spares and Recommended spares, as described below. The purchaser reserves the right to finalize the exact quantities of the spare parts and effect price adjustment on the basis of the unit rates quoted by the Bidder. The spares, ordered by the Purchaser, shall be delivered at site along with the main equipment.

6.2 In spite of all care taken by the Bidder, if certain spare part is not available with him and it is required for start-up commissioning then he can use from the spare bought by Owner. However, it shall be the responsibility of the Bidder to replenish the same, at the earliest, without additional cost to Purchaser.

6.3 The Bidder shall quote unit rates for each Mandatory Spares. The total price of all Mandatory Spares, as enlisted in the tender document, shall be considered for bid evaluation. The Purchaser reserves the right to alter the items and/or quantities of spares while placing the order.

6.4 Recommended Spares are those spares which the 'Bidder' considered necessary for normal plant operation, and which are not included in Mandatory Spares

specified by the Purchaser. The Bidder shall indicate in the schedule of Recommended Spares. Their Unit price shall be indicated in Price schedule. The Purchaser reserves the right to buy any or all of the Recommended Spare Parts. The total price of Recommended Spares shall not be considered while evaluating the tender.

6.5 All spares supplied under this Contract shall be strictly interchangeable with the parts for which they are intended to be replacements. The spares shall be treated and packed for long storage under the climatic conditions prevailing at the site.

6.6 Each spare shall be clearly marked or labeled on the outside of its packing with its description and purpose.

6.7 A spare parts list with identification tag nos. for each spare part shall be furnished by Bidder for Purchaser's use.

6.8 The Bidder shall guarantee the Purchaser that before going out of production of spare parts, for the Equipment furnished, he shall give atleast 12 months advance notice to Purchaser, so that the latter may order his requirement of spares in one lot, if he so desires.

6.9 Following are Mandatory Spares for Vertical Pumps (minimum one set per type of pump, if not specified elsewhere in specification):

1. Shaft
2. Impeller
3. Shaft sleeve
4. Bearing (each type)
5. O ring
6. Coupling (if any)
7. Wear Ring (Impeller & Casing)
8. Gland seals
9. Gaskets

7.0 PAINTING

7.1 Below are minimum painting requirements. Any stringent requirements mentioned in main project specification inline with corrosive category in area of installation shall be met by Vendor.

7.2 Preparation of Surfaces

All surfaces to be painted will be thoroughly cleaned of all grease, oil, loose mill scale, dust, rust and any other foreign matter. Mechanical cleaning by power tool and scrapping with steel wire brushes or shot / sand blasting will be adopted to clean the surfaces to SA 2 ½ as per BS:4232. Cleaning with solvents will be resorted to only in such areas where other methods specified above have not achieved the desired results. Cleaning with solvents will be adopted only after written approval of the OWNER /

ENGINEER. For bought out items of electrical and instrumentation the surfaces will be pretreated through chemical cleaning (7 tank process).

7.3 Primer Paint

Zinc silicate primer (minimum 75 micron Dry Film Thickness - DFT) will be inorganic (Ethyl) self curing high built (Solid by volume minimum 60%) formulation as per BS: 5493 (Inorganic Zinc rich systems). Primer will be applied to ensure a continuous film without 'holidays'.

7.4 Intermediate Paint

Intermediate (Under) coat (minimum 75 micron DFT) will be of polyamide cured titanium di-oxide / micaceous iron oxide pigmented high performance (solid by volume minimum 60%) epoxy coating as per BS : 5493 (two pack chemical resistant under coats).

7.5 Finish Paint

7.5.1 Finish coat (minimum 75 micron DFT) will be of polyamide cured colored pigmented high performance (solid by volume minimum 60%) epoxy coating as per BS: 5493 (two pack chemical resistant finishes).

7.5.2 Final finish coat (minimum 25 Micron DFT) will be of polyurethane colour pigmented (solid by volume minimum 40%) as per BS: 5493 (two pack chemical resistant finishes).

7.5.3 All paints including primer will be of reputed brand / manufacturer and as approved by the engineer.

7.6 Colour code to be followed for Pumps:

Pipe Content	Standard	Number	Colour Name
Service / Sea water	RAL	6027	Light Green
Effluent / Waste water	RAL	6010	Grass Green
Potable water	RAL	6026	Opal Green
Fire water	IS 5	536	Fire Red

8.0 LAYOUT AND MAINTENANCE REQUIREMENTS:

8.1 Pumps should fix in available space in such a way that sufficient space/clearance shall be provided around pump for man movement and maintenance purpose.

8.2 Pump casing shall be provided with lifting lug, eye bolts, etc. as required for the proper handling of each pump set.

8.3 Bearing housing, sealing arrangement, gland packing, cooling arrangement shall be designed in such a way that, it will be easy for maintenance/replacement without disturbing complete pump assembly.

8.4 Pump shall be supplied with vents and drain connections. All the drains shall be connected to nearest drain without routing directly on the pumphouse floor.

8.5 Pumphouse height constraints shall be considered for deciding pump assembly design.

8.6 In case of replacement/retrofit jobs,

8.6.1 Site constraints shall be understood and optimum design modifications shall be done based on site conditions.

8.6.2 Pump nozzles shall be one size lower than or equal to existing pipe sizes. Pump suction-discharge flange locations shall be matched with existing pipe flange locations to avoid major modification works in piping.

8.6.3 Foundation sizes shall be matched with existing foundation footprints to avoid major modifications in civil.

8.6.4 Any deviation shall be discussed and clarified prior to contract award.

9.0 DATA & DOCUMENTS TO BE FURNISHED BY BIDDER ALONG WITH BID:

9.1 Signed specification

9.2 Filled in Data sheets – B (Section -B) & Schedules as per enclosed formats duly filled in SI units for each Pump.

9.3 General arrangement drawings including dimensions, static & dynamic loading details, foundation details

9.4 Cross-sectional drawings of Pumps showing MOC details.

9.5 Pump performance curves flow rate Vs head for different impeller diameter (maximum, mean, minimum, supplied), BKW, efficiency, NPSHR from zero flow to maximum flow and torque-speed curve.

9.6 Motor efficiency Vs load curve.

9.7 All the Schedules as per main specification

9.8 Bidder shall completely study all sections of this specification and indicate all deviations in the Schedule of Deviations. If no deviations are indicated or except for the deviations indicated in the Bid, it will be presumed that the Bid conforms in all aspects to the specification and OWNER reserves the right to evaluate the Bid without any further reference to the Bidder. It is binding on the part of Bidder to supply the equipment in accordance with the specification except for the deviations accepted by the OWNER. No extra claims on this account will be accepted after the award of the Contract

9.9 Bidder shall furnish all the data information mentioned above, various schedules of the main specification without which the Bid is liable to be rejected.

10.0 DATA & DOCUMENTS TO BE SUBMITTED BY BIDDER POST AWARD OF CONTRACT:

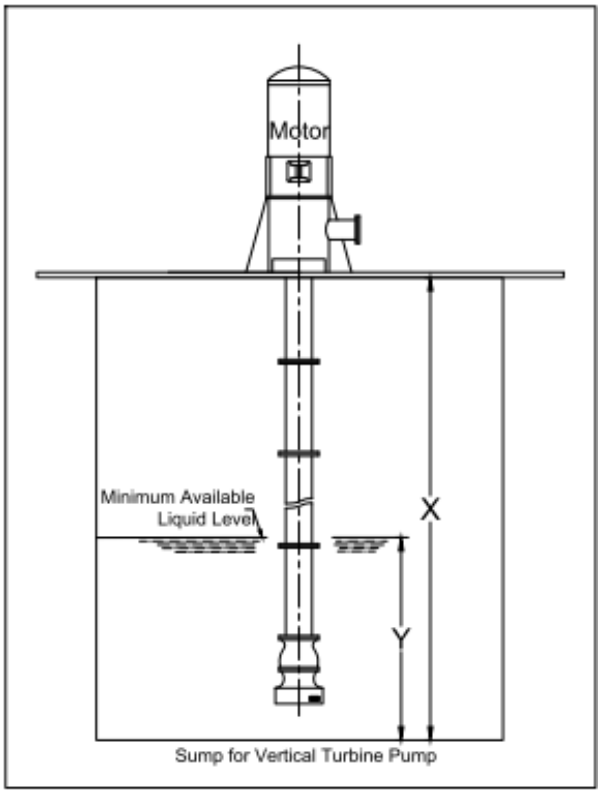
10.1 List of drawings and documents to be submitted for review, approval and information with scheduled submission dates

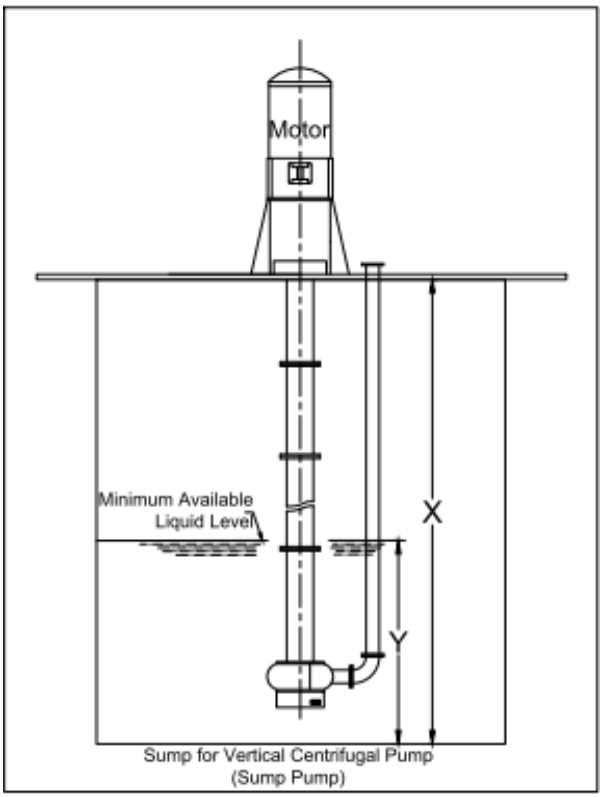
10.2 Manufacturing schedule.
10.3 Datasheet of pump as per datasheet B,
10.4 Pump performance curves flow rate Vs head for different impeller diameter (maximum, mean, minimum, supplied), BKW, efficiency, NPSHR from zero flow to maximum flow and torque-speed curve.
10.5 Detailed General arrangement drawings including dimensions, static & dynamic loading details, foundation details
10.6 Cross-sectional drawings of Pumps showing MOC details.
10.7 Scheme for pump sealing, lubrication and cooling
10.8 Motor drawing and characteristics
10.9 Painting procedure
10.10 Installation, operation and maintenance manual which shall include following:
a) Periodical, routine and preventive maintenance
b) Erection and dismantling procedures
c) Malfunctioning symptoms and troubleshooting procedures
10.11 Shop performance test report of motor, pump other components as per QAP
10.12 Final test report and inspection reports
10.13 As-built drawings
10.14 The Bidder shall submit minimum 4 nos. hard copies of all as built drawings/documents and also soft copy of all drawings in CD.
10.15 Detailed MQP, FQP & test/inspection procedures

DATA SHEET 1A
(Datasheet A of Pump)

Sr. No.	Description	Units	Vertical Pumps
1	General Data		
1.1	No.of Pumps	Nos.	W + S (Total -- nos.)
1.2	Location		Indoor / Outdoor
1.3	Duty of pump		Continuous / Intermittent
2	Liquid Characteristics		
2.1	Type		River water / Sea water / Effluent water
3	Design Data		
3.1	Design Standard		IS 1710, ISO 5199, IS 1710
3.2	Capacity	m^3/hr	
3.3	Total Head	MLC	
3.4	Maximum Speed	RPM	1500
4	Constructional Features of Pump		
4.1	Type of Pumps	--	Vertical Turbine /Vertical Centrifugal pump
4.2	Shaft Orientation / Mounting Arrangement		Vertical
4.3	Type of impeller		Enclosed / Semi open / Open
4.4	Type of Pump lubrication		Self
5	Material Of Construction		

5.1	Casing/ Bowl & Bell mouth		As per 3.2.13
5.2	Impeller		As per 3.2.13
5.3	Column pipe		As per 3.2.13
5.4	Shaft		As per 3.2.13
5.5	Shaft Sleeve		As per 3.2.13
5.6	Gland packing		As per 3.2.13
5.7	Base plate		As per 3.2.13
5.8	Fasteners		As per 3.2.13
6	Sump Details		
6.1	X	mm	
6.2	Y	mm	





DATASHEET 1B
Datasheet B for Pumps

Sr. No.	Description	Units	Values
1	General Data		
1.1	Make, Model		
1.2	Type of Pump		
1.3	No.of Pumps	Nos.	
2	Design Data		
2.1	Capacity	m^3/hr	
2.2	Total Head	MLC	
2.3	Head Losses	MLC	
2.4	Bowl head	MLC	
2.5	Shut off Head	MLC	
2.6	Pump Speed	RPM	
2.7	Pump Efficiency	%	
2.8	Bowl Efficiency	%	
2.9	Power consumption at rated capacity and head	KW	
2.10	Maximum power consumption	KW	
2.11	Minimum Continuous Safe flow	m^3/hr	

2.12	Minimum submergence required from sump bottom	mm	
3	Constructional Features of Pump		
3.1	No. of stages		
3.2	Type of drive transmission		Direct/gear/pulley
3.3	Type of Impeller		Semi open/Enclosed
3.4	Type of coupling		Flexible/Rigid
3.5	Type of pump lubrication		Self
3.6	No. of vanes	No.	
3.7	Flange drilling standard		
4	Liquid Characteristics		
4.1	Size of solids to be handled	mm	
5	Accessories Required		
5.1	Level Control System		Yes / No
5.2	Spare Parts		Yes / No
5.3	Maintenance Tools and Tackles		Yes / No
6	Motor Details		
6.1	Motor rating	KW	
7	Other Performance Parameters		
7.1	Power Consumption at Duty Point	KW	

7.2	Noise level throughout operating range	dBA	
7.3	Vibration Level throughout operating range	mm/s	
7.4	Bearing temperature alarm/trip	Deg. C	

Section B

Technical Requirement of Fire Protection and Detection System

Chapter No 7

Standard Specification for Sprinkler System.

ENGG/ P&L/STD-SPEC/ 016

THE TATA POWER COMPANY LIMITED

STANDARD

TECHNICAL SPECIFICATION

FOR

Sprinkler System

DOCUMENT NO - ENGG/ P&L/STD-SPEC/ 016

Tata Power

Generation Engineering

R2	13/5/2024	Revised and issued for use	J Shinde	D Das	N Mishra
R1	22/12/2021	Revised and issued for use	J Shinde	N Mishra	R Gadre
R0	9/7/2014	Issued for Info or Use	JSS	RSG	AJ
Rev. No	**Date**	**Description**	**Prepared By**	**Checked By**	**Approved By**

1. Scope

1.1. This specification covers technical requirement of sprinkler system specified in the section A.

2. Codes and Standards

2.1. Following are some of the important codes and standards relevant to this specification.

NFPA-13	Standard for installation of Sprinkler System
IS 3034	Fire Safety of Electrical Buildings: Electrical Generating and Distribution Station – Code of Practise
IS 15105	DESIGN AND INSTALLATION OF FIXED AUTOMATIC SPRINKLER FIRE EXTINGUISHING SYSTEMS - CODE OF PRACTICE
NFPA 850	Recommended Practice for Fire Protection for Electric Generating Plants and High Voltage Direct Current Converter Stations

3. Design Criteria & Lay out Requirements

3.1. Sprinkler system shall be designed as per NFPA 13.

3.2. The sprinkler installation shall be designed to the following hazard classification in accordance with NFPA 13

- Office area : Light Hazard
- Fire pump house : High Hazard
- Workshop : High Hazard

3.3. Minimum density for automatic sprinkler piping design:

- Light Hazard occupancy : 5 LPM\SQ.M over 140-sq. m area
- Storage : 20 LPM\SQ.M over 186-sq. m area

3.4. Maximum protection area per sprinkler 9 sq. meter and maximum spacing shall not exceed 3 meters between two sprinklers.

3.5. All equal and unequal fittings including but not limited to bends, elbows, tees, reducers, sockets shall be standard pipe fittings.

3.6. Pipe shall be size for 120% of design flow having design velocity 2.8 m/Sec at ambient temperature.

3.7. Pressure and flow requirement of the sprinkler system shall be as per NFPA 13.

3.8. Sprinkler head rating, type shall select as per NFPA 13 only.

3.9. The installation control valve shall be provided for each sprinkler riser. Installation control valve shall comprise of main stop valve, alarm valve with accessories, strainer, and motor gong.

3.10. Ball valve shall be provided for testing of sprinkler system at the farthest point and drainpipe shall be taken to nearest drain outlet by means of piping.

3.11. Sprinkler network for each floor shall be provided with suitable size of butterfly valve.

3.12. Flow switch shall be provided at the downstream of butterfly valve. Flow switch shall have UL listing.

3.13. Test and drain assembly shall be provided for each floor. Outlet of test and drain assembly shall be connected to drain riser.

3.14. Side wall sprinkler deflector shall be located not more than 150mm and not less than 102mm from ceiling.

3.15. Sprinkler shall be provided at false ceiling level and above false ceiling (if ceiling void is more than 800mm from the bottom of the slab)

3.16. CI gate valve shall be provided to Upstream of Alarm Control Valve.

3.17. CI gate valve shall be provided with pad lock arrangement .

3.18. All Flow switch and Pressure switches shall be interfaced with fire detection and alarm system.

4. Technical Parameter of Equipment's covered under Sprinkler system

4.1. Piping shall be galvanized to meet requirement of IS 4736. Pipes, Pipe fittings, Valves shall be as per standard specification no ENGG/ P&L/STD-SPEC/ 004.

4.2. Installation control valve shall be having UL listing and FM approved.

4.3. Flow switch shall have UL listing and FM approved.

4.4. Pressure switch shall have UL listing and FM approved.

4.5. Sprinkler head shall Have UL listing and FM approved. All sprinkler head shall powder coated.

5. Operation of Sprinkler System

5.1. Complete sprinkler system is subjected for system acceptance test as per NFPA 13, chapter 25 (edition 2013)

6. Inspection and Marking Requirements of Fire Hydrant system equipment's

6.1. TATA POWER or its authorized representative shall have access at all reasonable times to the manufacturer's works, where the equipment's of Fire sprinkler system are being manufactured and/or tested. Any defect / shortcomings pointed out shall be rectified to the satisfaction of inspectors.

6.2. Tata Power will inspect the any or all material at any stage of manufacturing as per approved Manufacturer quality assurance plan. Bidder is responsible for getting approval of all documents before proceeding further.

6.3. Bidder to refer minimum Inspection Requirement of various equipment's

6.4. Bidder to refer attached standard specification no ENGG/ P&L/STD-SPEC/ 014 for quality assurance requirement.

7. Spares

7.1. Bidder shall provide 10% of sprinkler head of all size (K factor & Angle) as spares with the quoted price.

7.2. A cabinet shall also to be provided to store the sprinkler head as per NFPA.

8. Data Submission by Bidder

8.1. Bidder shall furnish drawings and data sheet below listed equipment's for information along with the Offer.

i. Technical Data sheets and Product catalogue of the pipes, pipe fittings, sprinkler head, Installation control Valves, Pressure switch, flow switch and Strainers etc.

ii. Technical data sheet and product catalogue of Solenoid valve, Pressure switch & pressure Gauge.

8.2. Drawing document to be submitted by bidder after award of Contract

i. Technical Data Sheets of all listed equipment's covered under High Velocity Water Spray system

ii. Layout drawing of the complete system

iii. P&ID of complete system

iv. GA drawing of DVLCP

v. PG test procedure & Operation manual

vi. Hydraulic calculation for each sprinkler head considering AMAO.

Section B

Technical Requirement of Fire Protection and Detection System

Chapter No 8

Standard Specification for Medium Velocity Water Spray System.

ENGG/ P&L/STD-SPEC/ 015

THE TATA POWER COMPANY LIMITED

STANDARD

TECHNICAL SPECIFICATION

FOR

Medium Velocity Water Spray system for cable gallery

DOCUMENT NO - ENGG/ P&L/STD-SPEC/ 015

Tata Power

Generation Engineering

R3	22/12/2021	Revised and issued for use	J Shinde	D Das	N Mishra
R2	22/12/2021	Revised and issued for use	J Shinde	N Mishra	R Gadre
R1	31/03/16	Issued for Info or Use	SP	JSS	SMG
R0	7/7/2014	Issued for Info or Use	JSS	RSG	AJ
Rev. No	Date	Description	Prepared By	Checked By	Approved By

1. Scope

1.1. This specification covers standards specification for Medium Velocity Water Spray system for cable gallery for the areas specified in section A.

2. Codes and Standards

2.1. All equipment, system and services covered under this specification shall comply with all currently applicable statutes, regulations, and safety codes.

2.2. Following are some of the important codes and standards relevant to this specification.

NFPA-15	Standard for Water Spray fixed system for the fire protection system
IS 3034	Fire Safety of Electrical Buildings: Electrical Generating and Distribution Station – Code of Practise
NFPA 850	Recommended Practice for Fire Protection for Electric Generating Plants and High Voltage Direct Current Converter Stations
IS 12459	Code of Practise for Fire Safety in cable run

3. Design Criteria of MVWS system for Cable Gallery:

3.1. Medium Velocity Water Spray system for cable gallery shall be designed as per NFPA 15 guidelines for extinguishment purpose.

3.2. Design Density 6.1 LPM/ M^2 0n the projected plane containing cable tray or run. Protected area shall be divided into number of zones. Each zone shall have separate water supply network controlled by a deluge valve.

3.3. Bidder to consider main motor driven pump is in operation only. Accordingly, bidder to select the length of each deluge zone.

3.4. Zoning of MVWS system shall be such that if fire is in one zone than deluge valve of that zone shall actuate along with the actuation of all immediate neighbouring deluge valve which are supposed to actuate to prevent spread of fire in any direction.

3.5. Zoning shall be done considering actual water required per zone as per hydraulic calculation.

3.6. Zone length shall not exceed total actual water requirement of all zone (zone on Fire and adjacent zones of zone on fire) plus hose stream of 3400 LPM as per IS 3034.

3.7. Actual water requirement of MVWS system shall not be more than 120% of the Design water requirement of that zone.

3.8. For separate system (Separate Hydrant and spray network) zone length of MVWS system shall be such that actual water requirement of three zones (i.e., zone on Fire and adjacent two zones of zone on fire) shall not exceed pumping capacity of main motor driven spray pump. In any case zone length shall not exceed 45 meters for one deluge valve of separate spray system.

3.9. The fire in the cable vault/gallery shall be detected by a detection system, comprising of cross zoning of Detector at ceiling & LHS cable mounted cable tray which shall give an electrical signal for the operation of the deluge valve.

3.10. The system shall be hydraulically so designed that a minimum pressure of 2.8 bars is available at the remotest sprayer of cable gallery. Maximum pressure shall not exceed 3.5 Bar in the system.

Internal - All Employees of Tata Power

3.11. The velocity produced in the distribution pipes shall not exceed more than 5 m/sec.

3.12. Deluge valve of MVWS system shall actuate by means of (1) Fire signal from ceiling mounted detector (3) Fire Signal from LHS cable) (4) manual override valve on deluge valve.

3.13. Only latest version of PIPENET spray/sprinkler module to be used for carrying out hydraulic calculation of the complete system.

4. Layout Requirement of MVWs system for Cable Gallery

4.1. Each of the cable rows shall be provided with a network of water distribution piping and nozzles. The distribution network shall consist of distribution header for each row of cable tray and on these headers drop pipes located at an interval not exceeding 3 meters shall be provided to cover all the tiers.

4.2. If in one cable rack no of cable trays exceed three (03) then separate nozzles shall be provided for every fourth cable tray onward.

4.3. The distance between the last sprayer and the external wall or limits of area shall not exceed 1.5m anywhere.

4.4. The sprayers shall be installed in rows / number of rows at the central aisle between the cable trays and spaced at not more than 3 m from each other.

4.5. Each deluge valve shall provide with Manual call point with Hooter and flasher.

4.6. Linear heat detection system shall comprise digital LHS cable.

4.7. Linear heat sensor cables shall be provided on every alternate cable tray in Zig-Zag pattern for covering maximum surface area of cable tray.

4.8. LHS cable shall fix with cable tray with recommended mfg. fittings. If LHS cable runs straight in suspended manner, then LHS cable shall be supported with steel guide wire support at every 1.5 meter. The clear air space between protected surface and LHS cable shall not exceed Manufacturer recommendation.

4.9. LHS Cable shall terminate in one zone. Zone length of LHS cable shall not exceed 300 meter or Manufacturer recommendation whichever is less.

4.10. Isolation gate valve shall be provided for every 150 meter of spray/hydrant header.

4.11. Isolation gate valve shall be provided at the starting of tapping location from exiting/new spray/hydrant header wherever applicable.

4.12. One no. of isolation valve gate valve with Y type strainer shall be provided at the inlet of each deluge valve. The isolation valve and strainer will be located outside of deluge valve.

4.13. Each deluge valve shall have independent tapping from spray header/hydrant header. Clubbing of deluge valve with common gate valve and strainer or common manifold arrangement is not acceptable.

4.14. Deluge valve Housing with 2 hrs fire rating shall be provided along the DV. Bidder can use factory assembled Deluge Cabinet with Butterfly valve & limit switch arrangement at Upstream, downstream, & bypass line of deluge valve.

4.15. Location of deluge valve on header shall have easy and smooth access from the adjacent road. Bidder to locate deluge valve accordingly.

5. Technical Parameter of Equipment's covered under HVWS System

5.1. Pipe, Pipe Fittings & Valves etc shall confirm standard specification no ENGG/ P&L/STD-SPEC/ 004 attached with this specification.

Internal - All Employees of Tata Power

5.2. Deluge valve and its accessories shall be as per standard specification no ENGG/ P&L/STD-SPEC/ 001 attached with this specification.

5.3. MVWS nozzle shall have SS 304 MOC and shall have inbuilt strainer. Nozzle shall have UL listing.

6. Operation & Performance Testing of MVWS system

6.1. Deluge valve shall operate by following means

6.1.1. By actuating Detector mounted at ceiling level & By actuating LHS cable mounted on cable tray due to heat.

6.1.2. By opening manual override valve provided in deluge trim.

6.1.3. By pressing push button on Deluge valve control panel

6.2. Performance parameter of MVWS system shall be measured as per NFPA 15 only.

7. Inspection and Marking Requirements of Fire Hydrant system equipment's

7.1. TATA POWER or its authorized representative shall have access at all reasonable times to the manufacturer's works, where the equipment's of Fire Hydrant system are being manufactured and/or tested. Any defect / shortcomings pointed out shall be rectified to the satisfaction of inspectors.

7.2. Tata Power will inspect the any or all material at any stage of manufacturing as per approved Manufacturer quality assurance plan. Bidder is responsible for getting approval of all documents before proceeding further.

7.3. Bidder to refer minimum Inspection Requirement of various equipment's attached with this specification ENGG/ P&L/STD-SPEC/ 012.

7.4. Bidder to refer attached standard specification no ENGG/ P&L/STD-SPEC/ 013 for quality assurance requirement.

8. Performance Testing of MVWS System

8.1. Spray system shall be hydraulically tested and shall be capable of withstanding thirty minutes a pressure equivalent to 150% of the design pressure.

8.2. Full flow tests with water shall be done for the system piping as a means of checking the nozzle layout, discharge pattern and coverage, any obstructions and determination of relation between design criteria and actual performance, and to ensure against clogging of the smaller piping and the discharge devices by foreign matter carried by the water.

8.3. Rigidity of pipe supports shall also be checked during the water flow.

8.4. The maximum number of systems that may be expected to operate in case of fire shall be in full operation simultaneously to check the adequacy and condition of the water supply.

8.5. The discharge pressure at the highest and most remote nozzle shall not be less than the value for which the system was designed.

8.6. Operation of deluge/ alarm valve shall be checked by actuating detection system or opening the drain valve of deluge valve.

8.7. Resetting of deluge valve shall also be checked.

8.8. Cutting water supply to DV and restoring the same after some time shall not actuate the DV.

9. Spares

Internal - All Employees of Tata Power

9.1. Bidder shall provide 10% of MVWS nozzle of all size (K factor & Angle) as spares with the quoted price.

10. Data Submission by Bidder

10.1. Bidder shall furnish drawings and data sheet below listed equipment's for information along with the Offer.

i. Technical Data sheets and Product catalogue of the pipes, pipe fittings, HVWS Nozzles, Valves, and Strainers etc.

ii. Technical data sheet and product catalogue of Solenoid valve, Pressure switch & pressure Gauge.

10.2. Drawing document to be submitted by bidder after award of Contract

i. Technical Data Sheets of all listed equipment's covered under High Velocity Water Spray system

ii. Layout drawing of the complete system

iii. P&ID of complete system

iv. GA drawing of DVLCP

v. PG test procedure & Operation manual

Note: - Above listed document list is indicative only. Bidder to provide each detail asked by Purchaser of any equipment's covered in the overall project specification scope.

Internal - All Employees of Tata Power

Section B

Technical Requirement of Fire Protection and Detection System

Chapter No 9

Standards Specification for HVWS system - Transformer.

ENGG/ P&L/STD-SPEC/ 013

THE TATA POWER COMPANY LIMITED

STANDARD

TECHNICAL SPECIFICATION

FOR

High Velocity Water Spray System

DOCUMENT NO - ENGG/ P&L/STD-SPEC/ 013

Tata Power

Generation Engineering

R2	13/05/2024	Revised and issued for use	J Shinde	D das	N Mishra
R1	22/12/2021	Revised and issued for use	J Shinde	N Mishra	R Gadre
R0	6/7/2014	Issued for Info or Use	JSS	RSG	AJ
Rev. No	**Date**	**Description**	**Prepared By**	**Checked By**	**Approved By**

1. Scope

1.1. This specification covers standards specification for High Velocity Water Spray system (HVWS) for Transformer, reactor, NGT, NGR, Main oil tank, Boiler feed pump oil canal, etc as specified in the section A.

2. Design Criteria- Transformer

2.1. Complete system shall be designed as per NFPA 15.

2.2. Water shall be delivered to the risk at a rate of no less than 10.2 LPM/m² / as per applicable standard for all types of transformers, calculated on the surface of the regular shaped prism four sides, bottom and top of entire target equipment including transformer body, Radiator bank, conservator tank, cable boxes for which the risk could be exactly accommodated.

2.3. The system shall be hydraulically calculated and approved prior to the installation. PIPNET software shall be used for Hydraulic calculation

2.4. The system shall be hydraulically so designed that the pressure at the hydraulically most remote projectors in the network is not less than 3.5 bars. However, the maximum pressure in any projector within a network shall not exceed 5 bars.

2.5. The velocity in the spray pipes shall not exceed 10 m/s.

2.6. All pipe & pipe fittings & deluge valve shall confirm standards specification for LP piping provided in main specification.

2.7. All pipes & Pipe fittings downstream of deluge valve shall be Hot Dip Galvanized as per IS 4736 including wet pilot pipe.

2.8. The Q.B. detectors provided for Transformer deluge system shall be 78°C.

2.9. Deluge valve shall be provided with isolation Gate valve PN 1.6 rating at upstream, downstream & by-pass line.

2.10. 'Y' type strainer shall be provided at upstream of the deluge valve.

2.11. Provision for drain shall be provided below the deluge manifold header & also inside the pipe trenches. Suitable type of drain valve shall be provided & plugged.

3. Lay out requirement of HVWS System for Transformer.

3.1. The automatic fixed spray system shall consist of heat detecting devices, a deluge valve, spray nozzles, and piping network around the equipment to be protected.

3.2. The detector shall be of Quartz bulb type. The detectors will be placed on the pilot line which is filled with (pressurized) water.

3.3. Spray ring shall be placed 1200mm away from the transformer surface and distance between HVWS Nozzle tip and transformer body shall not exceed 800mm (Max) and 500 (min)

3.4. Transformers shall be protected using rings of nozzles there around with the top of the transformer and subsequently rings shall be formed around the transformer so that there shall be overlap between two subsequent nozzles (in vertical & horizontal plane) shall be 200mm minimum up to bottom thereof and beneath each continuous obstruction.

3.5. Separate ring shall be provided to spray water horizontally at the bottom of transformer if the transformer is at more than 300mm +/-10% above ground level. In case of transformers surrounded by concrete or asphalted surfaces, projectors must be employed in such a way as to wash off flammable liquids away from transformers.

3.6. Obstructed or 'roofed off' portions of the transformers shall be protected by separate projectors. For this purpose, it will be permissible to extend pipes from the nearest ring by means of a nipple. The terminal pipes extended from the ring mains shall need separate supports if they are 600 mm or longer.

3.7. Where radiators or cooler banks are located at more than 300 mm from the surrounding ground level, undersides shall be protected by projectors pointing upwards.

3.8. Where radiator /cooler bank are spaced more than 300 mm apart and where the transformer is separated at more than 300 mm from the radiator/ cooler bank, projectors shall be so arranged to spray into the space. Projector angles shall be so selected that the cone diameters at the entrance of space is equal to or slightly larger than the space.

3.9. While selecting the HVWS nozzle orifice and angle special care shall be taken considering overlap requirement of nozzle, Min distance requirement from transformer body, outdoor application, wind velocity and direct impingement of water jet on transformer body as envisaged in NFPA so that emulsification process can take place in case of transformer on fire.

3.10. Automatic detection equipment shall be so located and adjusted as to operate reliably. For transformers, the detector sprinklers shall be as close to the shell as possible at all places subject to electrical clearance.

3.11. The detectors shall be spaced at a maximum of 2.0 m intervals. The detectors shall be close to the transformer as possible and shall in no case be farther than 300 mm there from.

3.12. Additional detectors shall be required for specific known hazard points such as tap changers, cable boxes, vents, oil piping, etc.

3.13. Coolers and radiator banks associated with the transformer shall be provided with detectors at two levels.

3.14. Each radial branch of the wet pilot piping shall be extended up to the accessible height (1.2m) from the FFL inside the room and shall be provided with drain valve and plug.

3.15. The flanges of oil pipes shall be within 300 mm from detectors. The conservator tanks shall be provided with detectors it is sufficient to install detectors under the conservator tanks.

3.16. Piping fabrication shall be carried out as per "Good Engineering practices" cutting of holes by gas cutting and or any other method for mounting HVWS nozzle is not permitted. Use of standard pipe and pipe fitting shall ensure by bidder.

3.17. Piping shall be individually supported as far as possible. Transformer ribbings maybe used to support the piping. In no case, piping be supported on the body of the transformer.

3.18. Pylon support pipe shall be 80 NB pipe with IS 1239 part I heavy grade. RCC Pedestal support with footing shall be provided for each pylon support.

3.19. Pylon support pipe shall be provided with wrapping and coating for the portion buried underground, this wrapping coating shall be up to 500mm above FGL.

3.20. Complete piping is subject to hydro test at pressure 13.2 Bar and holding time shall be 30 minutes.

3.21. After successful Hydro test complete piping shall be painted with two coats of primer and two coats of finish paints. Shade shall be Fire Red.

4. <u>Technical Parameter of Equipment's covered under HVWS System</u>

4.1. Pipe, Pipe Fittings & Valves etc shall confirm standard specification no ENGG/ P&L/STD-SPEC/ 004 attached with this specification.

4.2. Deluge valve and its accessories shall be as per standard specification no ENGG/ P&L/STD-SPEC/ 001 attached with this specification.

4.3. HVWS nozzle shall have SS 304 MOC and shall have inbuilt strainer. Nozzle shall have UL listing.

5. Operation & Performance Testing of HVWS system

5.1. Deluge valve shall operate by following means

5.1.1. By actuating Quartzite bulb detector due to heat.

5.1.2. By opening manual override valve provided in deluge trim.

5.1.3. By pressing push button on Deluge valve control panel

5.2. Performance parameter of HVWS system shall be measured as per NFPA 15 only.

6. Inspection and Marking Requirements of Fire Hydrant system equipment's

6.1. TATA POWER or its authorized representative shall have access at all reasonable times to the manufacturer's works, where the equipment's of Fire Hydrant system are being manufactured and/or tested. Any defect / shortcomings pointed out shall be rectified to the satisfaction of inspectors.

6.2. Tata Power will inspect the any or all material at any stage of manufacturing as per approved Manufacturer quality assurance plan. Bidder is responsible for getting approval of all documents before proceeding further.

6.3. Bidder to refer minimum Inspection Requirement of various equipment's attached with this specification ENGG/ P&L/STD-SPEC/ 012.

6.4. Bidder to refer attached standard specification no ENGG/ P&L/STD-SPEC/ 014 for quality assurance requirement.

7. Performance Testing of HVWS System

7.1. Spray system shall be hydraulically tested and shall be capable of withstanding thirty minutes a pressure equivalent to 150% of the design pressure.

7.2. Full flow tests with water shall be done for the system piping as a means of checking the nozzle layout, discharge pattern and coverage, any obstructions and determination of relation between design criteria and actual performance, and to ensure against clogging of the smaller piping and the discharge devices by foreign matter carried by the water.

7.3. Rigidity of pipe supports shall also be checked during the water flow.

7.4. The maximum number of systems that may be expected to operate in case of fire shall be in full operation simultaneously to check the adequacy and condition of the water supply.

7.5. The discharge pressure at the highest and most remote nozzle shall not be less than the value for which the system was designed.

7.6. Operation of deluge/ alarm valve shall be checked by actuating detection system or opening the drain valve of deluge valve.

7.7. Resetting of deluge valve shall also be checked.

7.8. Cutting water supply to DV and restoring the same after some time shall not actuate the DV.

8. Spares

8.1. Bidder shall provide 10% of HVWS nozzle of all size (K factor & Angle) as a spare with the quoted price.

9. Data Submission by Bidder

9.1. Bidder shall furnish drawings and data sheet below listed equipment's for information along with the Offer.

i. Technical Data sheets and Product catalogue of the pipes, pipe fittings, HVWS Nozzles, Valves, and Strainers etc.

ii. Technical data sheet and product catalogue of Solenoid valve, Pressure switch & pressure Gauge.

9.2. Drawing document to be submitted by bidder after award of Contract

i. Technical Data Sheets of all listed equipment's covered under High Velocity Water Spray system

ii. Layout drawing of the complete system

iii. Hydraulic calculation

iv. P&ID of complete system

v. GA drawing of DVLCP

vi. PG test procedure & Operation manual

Note: - Above listed document list is indicative only. Bidder to provide each detail asked by Purchaser of any equipment's covered in the overall project specification scope.

Section B

Technical Requirement of Fire Protection and Detection System

Chapter No 10

Standard specification for LT Motors

ENGG/ P&L/STD-SPEC/ 019

THE TATA POWER COMPANY LIMITED

STANDARD

TECHNICAL SPECIFICATION

FOR

Standard Specification for LT Motor

ENGG/ P&L/STD-SPEC/ 019



Tata Power

Project Engineering

SCOPE

1.1 The specification covers the design, material, constructional features, manufacture, inspection and testing at the BIDDER'S/his SUB-BIDDER'S works, delivery to site and performance testing of Low voltage induction motors rated up to 1000V.

2.0 **CODES AND STANDARDS**

2.1 The design, material, construction, manufacture, inspection, testing and performance of induction motors shall comply with all currently applicable statutes, regulations and safety codes in the locality where the equipment will be installed. The equipment shall also conform to the applicable standards specified in data sheet A1 latest revision as on the date of offer Nothing in this specification shall be construed to relieve the BIDDER of this responsibility. In case of conflict between the standards and this specification, this specification shall govern.

3.0 **DRIVEN EQUIPMENT**

3.1 When this specification forms part of the driven equipment specification, information not given in the Data Sheet-A1 will be governed by the driven equipment specification.

3.2 Motors shall be capable of satisfactory operation for the application and duty as specified in the motor Data Sheet-A1 and as specified for the driven equipment.

4.0 **PERFORMANCE AND CHARACTERISTICS**

4.1 Motors shall be capable of giving rated output without reduction in the expected life span when operated continuously under either of the following supply conditions as specified in Data Sheet-A1.

		Supply Condition	
		I	**II**
(a)	Variation in supply voltage from rated voltage	±6%	+10%, -15%
(b)	Variation in supply frequency from rated frequency	±3%	±5%
(c)	Combined voltage and frequency variation	9%	10%

4.2 Motors shall be suitable for the method of starting specified in the Data Sheet-A1.

4.3 The minimum permissible voltage shall be 85% of the rated voltage during motor starting.

4.3.1 Motors shall be capable of starting and accelerating the load with the applicable method of starting, without winding temperatures reaching injurious levels, when the supply voltage is in the range of 85% of the rated motor voltage to maximum permissible voltage specified in Data Sheet-A1.

4.4 The locked rotor current of the motor shall not exceed 600% of full load current (including IS Tolerances) unless otherwise specified.

4.5 Motors shall be capable of developing the rated full load torque even if the supply voltage drops to 70% of the rated voltage. If such operation is envisaged for a period of one second, the pull out torque of the motor shall be atleast 205% of full load torque.

4.6 Motors when started with the driven equipment coupled, shall be capable of withstanding atleast two successive starts from cold conditions & one start from hot condition without injurious heating of windings. The motors shall also be suitable for three equally spread starts per hour under the above referred supply conditions.

4.7 Motors shall be of Energy Efficient type. Category of Energy efficiency shall be of Class 2

4.8 All electrical devices, particularly solid state/ electronic components shall be suitable for trouble-free satisfactory operation, if located outdoors around the steam generator where high ambient temperature and dusty conditions will prevail.

4.9 Following Design margin over shaft power after considering the pump efficiencies shall be included while selecting the rating of motor used for pump:–

i) Motors < 20kW – 25% .
ii) Motors 20kW to 50kW – 20%
iii) Motors > 50kW – 15%

4.10 All motors shall be designed to withstand at least 5% harmonic in the supply voltage

5.0 INSULATION

5.1 The insulation shall be given tropical and fungicidal treatment for successful operation of the motor in hot, humid and tropical climate.

5.2 Insulation of VFD controlled Motors shall be designed to withstand a dv/dt of 0.1 micro sec rise from 10 % to 90 % of steady voltage and a maximum peak of 1600 volts as per NEMA standard MG1 Part 31.40.4.2

6.0 TEMPERATURE RISE

6.1 The temperature rises shall not exceed the values given in IS 12802. Under extremes of supply condition (clause 4.1 above), the temperature rise shall not exceed the value indicated in IS by 10^{o}C.

6.2 For motors specified for outdoor installation heating due to direct exposure to solar radiation shall be considered.

7.0 CONSTRUCTIONAL FEATURES

7.1 Motors weighing more than 25 kg. shall be provided with eyebolts, lugs or other means to facilitate safe lifting.

7.1.1 Canopy shall be provided for all outdoor motors.

7.1.2 All windings shall be of Copper

7.1.3 Motors located at hazardous area shall be of flame proof type.

7.2 RATING PLATE

7.2.1 The following details, in addition to those specified in applicable standards shall be included on the rating plate.

i) Name of the Manufacturer.
ii) Serial no. and frame reference.
iii) Rated voltage & winding connections.
iv) Name of the motor
v) Type of the motor
vi) Rated output in kW.
vii) Current in amperes at rated output.
viii) Frequency in Hz.
ix) Type of Dusty
x) Class of insulation.
xi) Number of phases.
xii) Speed in rpm, at rated output.
xiii) Efficiency at rated output.
xiv) Rotor (secondary) voltage and winding connections (for wound rotor motors).
xv) Rotor (secondary) current in amperes at rated output (for wound rotor motors).
xvi) Ambient temperature.
xvii) Degree of Protection

7.2.2 Type of bearings, recommended lubricant, lubricating interval & re-lubricating quantity, can be added as per the requirement.

8.0 BEARINGS

8.1 Unless otherwise specified in data sheet-A1, motor bearings shall not be subjected to any external thrust load.

8.2 Unless otherwise specified, motor bearings shall have an estimated life of atleast 40,000 hrs.

8.3 The bearings shall permit running of the motor in either direction of rotation.

8.4 If the bearings are oil lubricated, a drain plug shall be provided for draining residual oil & an oil level sight gauge shall be provided to show the precise oil level required for stand still and running conditions.

8.5 It shall be possible to lubricate the bearings without dismantling any part of the motor.

8.6 VFD Controlled Motors shall have their bearings insulated to prevent motor shaft currents from entering the bearing race.

9.0 **TERMINAL BOX**

9.1 Terminal boxes shall have a degree of protection of at least IP 55 for outdoor application

9.2 Unless otherwise approved, the terminal box shall be capable of being turned through 360° in steps of 90°.

9.3 Terminals shall be of stud type & the terminal box shall be complete with necessary lugs, nuts, washers earthing studs.

9.4 When single core cables are to be used the gland plates shall be of non magnetic material.

9.5 Sizes of terminal boxes and lugs shall be as given in Table-I, unless specified otherwise in data sheet A1 or Section C.

TABLE- I

415 V MOTORS - SIZES OF CABLES, STUDS, TERMINAL LUGS & TERMINAL BOXES

(TO BE PROVIDED ON MOTORS BY BIDDER)

SL. NO.	MOTOR RATING kW	1100V Al Conductor armoured PVC Cable Cores x mm^2	Stud Size	Terminal lug size of DOWELL MAKE equivalent to DOWELL'S CAT NO.	Minimum Terminal Box Size H x W x D mm x mm x mm
1.	Upto 3	3x4	M6	CUS/06	100 x 100 x 60
2.	3.1 - 7.5	3x6	M6	CUS/07	100 x 100 x 60
3.	7.6 - 15	3x16	M6	CUS/09	100 x 100 x 60
4.	16 - 25	3x35	M8	CUS/12	150 x 150 x 75
5.	26 - 40	3x70	M10	CUS/17	200 x 200 x 100
6.	41 - 55	3x120	M12	CUS/22	400 x 400 x 125
7.	56 - 70	3x185	M16	CUS/28	450 x 450 x 150
8.	71 - 85	3x240	M20	CUS/30	500 x 500 x 200

9.	86 - 110	3x400	M20	CUS/33	600 x 600 x 200
10.	111 - 175	3x1Cx500	M20	CUS/34	600 x 200 x 200 (3 separate cable boxes for the 3 single core cables)

10.0 **PAINT AND FINISH**

10.1 All motor parts exposed directly to atmosphere shall be finished and painted to produce a neat and durable surface which would prevent rusting and corrosion. The equipment shall be thoroughly degreased, all rust, sharp edges and scale removed and treated with one coat of primer and finished with two coats of grey enamel paint.

11.0 **HEATING DURING IDLE PERIODS**

11.1 For motors rated 30 kW and below, during idle periods, the stator winding will be connected to a 240 V single phase, 50 Hz, AC supply for heating and elimination of moisture. The supply will be connected between any two terminals.

11.2 Motors rated above 30 kW shall have space heaters suitable for 240V, single phase, 50 Hz, AC supply. Space heaters shall have adequate capacity to maintain motor internal temperature above dew point to prevent moisture condensation during idle period. The space heaters shall be placed in easily accessible positions in the lowest part of the motor frame.

12.0 **ACCESSORIES**

12.1 Two independent earthing points shall be provided on opposite sides of the motor, for bolted connection of the PURCHASER'S earthing conductors as specified in data sheet-A1. These earthing points shall be in addition to earthing stud provided in the terminal box.

12.2 Except when otherwise specified, the motors shall be provided with a bare shaft extension having a key slot and a key at the driving end.

13.0 **TESTS**

13.1 Motor shall be subjected to all the routine tests as per IS 325 in the presence of the PURCHASER'S representative. Copies of test certificates of type and routine tests, shall be furnished as specified in the distribution schedule, for the PURCHASER'S approval. Type test certificates for similar motors conducted within last 5 years from the date of bid submission shall be furnished with the Bid The BIDDER shall ensure to use calibrated test equipment/instruments having valid calibration test certificates from standard laboratories traceable to national/international standards.

INFORMATION TO BE SUBMITTED BY THE BIDDER

AFTER AWARD OF CONTRACT

1.0 Technical particulars as per data sheet B of tender specification. (Based on motor manufacturer)

2.0 Type and frame size :

3.0 Starting time (Secs)

3.1 With 100% voltage at terminals

3.2 With minimum voltage at terminals (at ____ % Rated voltage)

3.3 With 110% voltage at terminals

4.0 Safe stall time at 100/110% rated voltage under hot/cold condition.

5.0 Type and size of cable for which gland is provided in the terminal box :

6.0 Type of bearings and expected life.

7.0 Total weight of motor (kg)

7.1 Weight of Stator (kg)

7.2 Weight of Rotor (kg)

8.0 Motor GD^2 :

9.0 Efficiency (%)

9.1 Full Load Efficiency

9.2 75% Load Efficiency

9.3 50% Load Efficiency

9.4 25% Load Efficiency

10.0 Power Factor

10.1 Full Load Power Factor

10.2 75% Load Power Factor

10.3 50% Load Power Factor

10.4 25% Load Power Factor

11.0 Torque (% FLT)

11.1 Starting

11.2 Maximum (Pullout torque)

11.3 Pull up torque

12.0 Type of Enclosure

13.0 Cooling designation

14.0 Space heaters

14.1 Rated voltage/number

14.2 Rating total

14.3 Separate terminal box provided

15.0 Motor reactances (Pu)

15.1 Subtransient reactance

15.2 Transient reactance

15.3 Steady state reactance

16.0 Guaranteed losses (kW)

16.1 Iron loss

16.2 Copper loss

16.3 Friction, Windage & Stray losses

17.0 Motor outline dimension drawing (Number of copies as per distribution schedule)

18.0 Type test certificates (Number of copies as per distribution schedule)

19.0 Speed torque curve at rated & minimum starting voltage.

20.0 Current - speed curve.

21.0 Current - time curve.

22.0 Efficiency, power factor, slip, current against output curve.

23.0 Thermal withstand characteristic for motors of 100 kW & above - Hot & Cold.

24.0 Negative sequence current Vs time curve for motor of 100 kW & above.

25.0 Rotor voltage/Rotor current (for wound motors).

26.0 Negative Phase sequence current (I^2) withstand capability curve

27.0 Thermal withstand constant

DATASHEET A1

SL.NO.	DESCRIPTION	UNIT	TECHNICAL PARTICULARS
1.0	GENERAL		
1.1	APPLICATION		BY BIDDER
1.2	NUMBERS REQUIRED		BY BIDDER
1.3	TYPE OF MOTOR		SQUIRREL CAGE
1.4	SUPPLY SYSTEM FAULT LEVEL	MVA	50KA
1.5	TYPE OF EARTHING OF SUPPLY SYSTEM NEUTRAL		EFFECTIVELY EARTHED
2.0	RATING		
2.1	RATED OUTPUT :	kW	BY BIDDER
2.2	RATED VOLTAGE :	V	415
2.3	NUMBER OF PHASES & FREQUENCY		3 & 50
2.4	SUPPLY CONDITION (REF. CL.NO.4.1 OF SPECIFICATION		II
2.5	SYNCHRONOUS SPEED	RPM	BY BIDDER
3.0	DUTY		
3.1	TYPE OF DUTY (CLAUSE 9.2 OF IS:325 OR EQUIVALENT)		S1
3.2	POWER REQUIRED BY LOAD	kW	BY BIDDER
3.3	ENERGY EFFICIENCY CLASS AS PER IS-12615		EFF2
4.0	METHOD OF STARTING		D.O.L / Star delta.

SL.NO.	DESCRIPTION	UNIT	TECHNICAL PARTICULARS
5.0	INSULATION		
5.1	CLASS OF INSULATION		F
5.2	REF. AMBIENT TEMPERATURE	deg.C	50
5.3	TEMPERATURE RISE OF WINDING BY WDG RESISTANCE METHOD	deg.C	Corresponding to Class B Insulation
6.0	INSTALLATION		
6.1	LOCATION		Indoor/Outdoor
6.2	HAZARDOUS AREA DIVISION (IS:5572 OR EQUIVALENT)		As Per the Requirement
6.3	ATMOSPHERE		INDUSTRIAL CONDUCTIVE/ DUSTY
7.0	ENCLOSURE		
7.1	TYPE OF COOLING (IS 6362)		TEFC
7.2	DESIGNATION FOR DEGREE OF PROTECTION (IS 4691)		IP 54 FOR INDOOR / IP 55 WITH CANOPY FOR OUTDOOR
7.3	NOISE LEVEL	dB	85 dBA at 1 Meter
8.0	MAIN TERMINAL BOX		
8.1	LOCATION AS SEEN FROM NON- DRIVE END:		BY BIDDER
8.2	RATINGS (a) SHORT TIME		

SL.NO.	DESCRIPTION	UNIT	TECHNICAL PARTICULARS
	i. CURRENT :	kA(RMS)	50KA FOR 0.25 SEC.
	ii. DURATION :	SECS.	
	(b) DYNAMIC :	kA(PEAK)	105 KA
8.3	EXTERNAL CABLE DETAILS		
8.3.1	TYPE		BY BIDDER
8.3.2	SIZE & NO OF CORES		BY BIDDER
8.4	EARTHING CONDUCTORS		BY BIDDER
8.4.1	MATERIAL		BY BIDDER
8.4.2	SIZE		BY BIDDER
9.0	MISCELLANEOUS REQUIREMENTS		**TO BE FILLED IF MOTORS ARE BOUGHT SEPERATELY**
9.1	SHAFT ORIENTATION		BY BIDDER
9.2	MOUNTING SYMBOL (IS:2253 OR EQUIVALENT)		BY BIDDER
9.3	ROTATION AS SEEN FROM NON-DRIVE END		BY BIDDER
9.4	TYPE OF BEARING		BY BIDDER
9.4.1	DRIVE END		BY BIDDER
9.4.2	NON DRIVE END		BY BIDDER
9.5	WHETHER BED PLATE REQUIRED		YES/NO
9.6	MOTOR SHALL MATCH THE FOLLOWING TORQUE REQUIREMENTS OF THE DRIVEN EQUIPMENT:		
a)	STARTING TORUE		

SL.NO.	DESCRIPTION	UNIT	TECHNICAL PARTICULARS
b)	FULL LOAD (RATED) TORQUE		
c)	PULL OUT TORQUE		
d)	PULL UP TORQUE		
9.7	COUPLING BY MOTOR SUPPLIER		YES/NO
9.8	IF YES, TYPE OF COUPLING		
9.9	GD^2 of LOAD		
10.0	COLOUR SHADES OF PAINT		
11	a) WHETHER VIBRATION PADS REQUIRED		YES/NO
	B) IF REQUIRED SIZE OF THE PAD		
12	TEMPERATURE DETECTORS/ INDICATORS		
12.1	EMBEDDED TEMPERATURE DETECTORS FOR WINDING REQUIRED		YES/NO
12.2	EMBEDDED TEMPERATURE DETECTORS FOR BEARINGS REQUIRED		YES/NO
12.3	RTD FOR BEARING TEMP MEASUREMENT FOR DRIVING END & NON DRIVING ENDS REQUIRED		YES/NO

SL.NO.	DESCRIPTION	UNIT	TECHNICAL PARTICULARS
13	SPACE HEATERS FOR MOTORS REQUIRED		YES/NO

Section B

Technical Requirement of Fire Protection and Detection System

Chapter No 11

Standard specification for LV Switchgear.

ENGG/ P&L/STD-SPEC/ 010

THE TATA POWER COMPANY LIMITED

STANDARD

TECHNICAL SPECIFICATION

FOR

LV Switchgears

(DOCUMENT NO - ENGG/ ELECT/STD-SPEC/2017/22)

Tata Power

Project Engineering

Rev. No	Date	Revision History	Prepared By	Checked By	Approved By (HOD)
R0	14-09-2017	Specification issued for comments	TP	AAB	AM
R1	08-08-2018	Specification issued after incorporation of comments	TP	SBL	AM for PC

Contents

1. Introduction

2. Pre-Qualifying Requirements and Approved Vendor List

3. System Description and Scope

4. Codes & Standards.

5. Design Requirements

6. Layout Requirements for the equipment

7. Operational Requirements

8. Technical Parameters of Equipment including DATA SHEET

9. Quality Requirements (including SQP and FQP)

10. Inspection, Testing and Performance Requirements along with Warranty

11. Mandatory Spares

12. Data Submission by Bidder

    12.1 With the Bid

    12.2 After award of contract

1. Introduction

This specification covers engineering, design, manufacture, testing at works, supply, transport to site, installation, testing at site and commissioning of LV Switchgear according to the standard engineering practices, IS or IEC standards.

2. Pre-Qualifying Requirements and Approved Vendor List

2.1. Qualification Requirements

2.1.1. The Bidder must have designed, manufactured, supplied, installed and commissioned at least 50 nos. of 415V switchgears in the last 5 years.

2.1.2. At least 10 nos. of 415V switchgears supplied by the bidder shall be in satisfactory service for at least two years.

2.1.3. Bidder shall have independent NABL certified lab type tested reports for similar rated LV switchgear. The type test reports shall not be more than 5 years old from date of bid opening. Same shall be submitted for owner's review.

2.1.4. Acceptance of Owner's preferred list of vendor / sub vendor / OEM, which will be shared as part of Technical Specifications. However, if Bidder introduces additional vendor/sub vendor the same will be evaluated separately. This vendor/sub vendor evaluation / assessment shall inter-alia include (i) document verification; (ii) Bidders work / manufacturing facilities visit (iii) manufacturing capacity, details of works executed, works in hand, anticipated in future and the balance capacity available for present scope of works; (iv) details of plant and machinery, manufacturing and testing facilities, manpower and financial resources; (v) details of quality systems in place; (vi) past experience and performance; (vii) customer feedback; (viii) response to complaint.

2.1.5. Acceptance without any deviations of minimum quality requirements defined in Tata Power SQP and SFP attached to this technical specification.

2.2. Approved Vendor List

Larsen & Toubro Limited	Ahmednagar
Siemens Limited	Kalwa, Mumbai
Schneider Electric	Vadodara & Kolkata
ABB Ltd.	Bangalore
GE Power Controls	Chennai
C&S Electric	New Delhi
Masstech Controls Pvt. Limited	Jalgaon
Popular Switchgear.	Nasik
Vimac Controls Pvt.Ltd	Mumbai
Crompton & Greaves	Mumbai
Dharia Switchgear.	Mumbai

Components used in the LV switchgear shall be of following approved makes:

1	MCCBs/MPCBs/MCB	L&T/ Siemens/ Schneider/ABB/GE Power
2	Relays	Siemens/ABB/GE
3	Meters	AE/ IMP
4	Digital Energy Meters	L&T/ Secure/ ABB / SATEC
5	Multi-Function Meter	Satec
6	Switches	L&T/ Kaycee
7	CTs/ PTs	Pragati/ Indcoil
8	Terminal blocks	Elmex/ connectwell
9	Space heater	Girish
10	Fuses	GE/L&T/ Siemens/ Schneider Electric
11	Contractor	Siemens/ Schneider/L&T

Items supplied of different make other than specified above, is not encouraged.

3. System Description and Scope

3.1. Engineering, design, manufacture, testing at works, supply, transport to site, installation, testing at site and commissioning of switchgear as per site requirement.

3.2. Demonstration / testing of the system at Bidder's works before dispatch of the system at site (FAT).

3.3. Installation, testing & commissioning of the system including integration with Owners systems, sub-vendors' systems & other systems and performance under supervision of OEM's representative.

3.4. Site Acceptance Test to the Purchaser's satisfaction.

3.5. Submission of technical documentation related to design, installation, testing, operation & maintenance of the equipment and submission of Test Reports, job progress reports etc.

3.6. Submission of type test report as per IS/IEC which are of same rating and not more than 5 years old from date of bid submission.

It is not the intent of this specification to specify completely herein, all details of design & construction of switchgear. However, the equipment shall conform in all respects to high standards of engineering, design & workmanship.

4. Codes & Standards.

4.1. The design, manufacture and performance of equipment shall comply with all currently applicable statutes, regulations and safety codes in the locality where the equipment will be installed. Nothing in this specification shall be construed to relieve Bidder of his responsibility.

4.2. Given below are the acceptable code and standards. The Bidder shall take Owners approval for use of other codes & standards.

IS 13947 - Low Voltage Switchgear and Control gear

IS 8623 - Low Voltage Switchgear and Control gear Assemblies

IS 10118 - Code of Practice for Selection, Installation and Maintenance of Switchgear and Control gear

5. Design Requirements

5.1. General Technical Requirement for LV switchgear:

Complete switchgear shall comply with the following requirements:

A1.	415 V Switchgear & Busbar Rating		
1.0	Rated voltage, Phase & Frequency		415V , Three phase, 50 Hz for AC
2.0	System Neutral Earthing		Solidly Grounded
3.0	Maximum system voltage	Volts	440V
4.0	A) One-minute Power frequency voltage	Volts	2500V for power circuit 2500V for control circuit
	B) Impulse voltage with-stand	Volts	2500 V
5.0	Continuous current rating of bus bars under site reference ambient temperature.		
6.0	Reference ambient Temperature	Deg. C	50^{0}C
7.0	Maximum Temperature of Bus bars, Droppers and Contacts at continuous current rating under site reference ambient temperature.	Deg. C	90^{0}C
8.0	Short circuit withstand for Bus bars and droppers		50 kA 1 sec
	A) Short time (1 sec) at 415 V	kA (RMS)	50 kA(RMS)-ACDB
	B) Dynamic rating	KA	110KA-ACDB
9.0	Standard Applicable		IS 13947 / IS 8623 / IS 10118
10.0	Thickness of Sheet steel	Mm	2.5mm (Frame), 1.6mm (Doors and Covers)

11.0	Degree of protection as per IS:13947		IP 54 for indoor type IP 55 for outdoor type
12.0	Earthing bus material and size		Copper of min 50X6 sq.mm
13.0	Main Busbar Material		Copper /Aluminium (As given in section A)
13.2	Clearances in air of live parts		Phase to Phase: 30 mm Phase to Earth: 30 mm
14.0	Mounting arrangement		Floor mounting with stand wherever required
15.0	Colour (power coating)		Light Grey shade 631 of IS 5 / RAL 7032

16.0	Designation	Bus-bar Details			Cable entry	Indoor / outdoor
		Amp	Current Density	TP/TPN		
	415 V Switchgear	1.25 times Incomer MCCB Rating	for Cu 1.2 A / sq.mm For Al 0.8 A / sq.mm	TPN	Bottom	Indoor

5.2. **Technical Requirements for Incomers & Bus Couplers**

5.2.1. Supply of ACB / MCCB / MCB for I/C and B/C shall be as follows

I/C and B/C Rating	Requirement
< 63 A	**MCB**
>63 A and < 400A	**MCCB**
> 400A	**ACB**

5.2.2. The incomer modules shall be interlocked with their upstream breaker such that they can be closed only when upstream breaker is closed and trip automatically when upstream breaker is tripped.

5.2.3. Changeover scheme for Incomers

5.2.3.1. The switchgear with sectionalized buses will be normally operated with the bus coupler breakers open. Auto changeover facility shall be provided for all switchgears such that if there is a prolonged under-voltage on any one of the bus sections, the respective incoming, breaker shall trip and the bus coupler breaker shall close,

provided voltage is available on the other bus section. Total changeover time shall not exceed 1.5 seconds. This auto changeover shall be blocked if the incoming breaker had tripped either on a protection operation due to fault on bus or I/C breaker has been opened manually.

5.2.3.2. Changeover back to the normal source of supply shall be affected manually. Manual live changeover facility shall be provided for all the switchgears which are fed by service transformers.

5.2.3.3. When planned outage of one of the normal incoming supplies is required, the respective incomers shall be tripped automatically after the bus section breaker is closed manually. For this purpose, a selection shall be provided on SCADA in control room as well as local to switchgear for selecting the incomer to be tripped. Thus, depending on the selection made, incomer to bus section – I or to bus section – II will be tripped once bus section breaker is closed manually, thus maintaining continuity of supply.

When system is neutralized after outage and both the incomers are healthy the selective tripping switch should be positioned to trip bus section breaker.

5.2.3.4. A timer with a time delay on pick up of 0.5. - 5 sec. for annunciation of the running breaker failing to trip within a pre-set time, (i.e. if the two sources remain paralleled for more than a pre-set time) shall be provided. When the normal supply is to be brought back into operation, the incomer breaker shall be closed where upon the bus coupler shall trip automatically.

5.2.3.5. All hardware required for meeting the functional requirements stated above, whether specifically listed out in the specification or not, shall be included in the scope of supply.

5.2.3.6. Direct contacts shall be used for change over logic. If the contacts are insufficient, they shall be multiplied using bi-stable relays.

5.2.4. Changeover Scheme for DG

5.2.3.1 On sensing of "No voltage" on Bus I, Bus II and Bus III, DG will start automatically.

5.2.3.2 Once the voltage and speed of DG is built up (Voltage >80% and Engine speed reached to rated speed), DG incomer breaker to close on dead bus, provided Bus I and Bus II incomers are open (Both incomers shall trip on under voltage) and there is no fault on Bus I and Bus II.

5.2.3.3 When power supply is restored DG incomer is opened manually and Bus II, Bus III bus coupler is closed manually restoring the supply to normal.

5.2.3.4 3 Nos. current transducers for each incomer's and 3 Nos. Of voltage transducer for each section of bus voltage shall be provided for remote monitoring. Transducers to be provided in motor feeders for remote display of currents in fire pump PLC system.

5.2.3.5 Potential free contacts shall be provided in all feeders for giving breaker and equipment status feedback to PLC/SCADA. Some of these can be grouped and finalized at the time of detailed engineering.

The following minimum protections shall be provided for incomers and bus couplers.

a. 3 phase inverse time over current relays
b. Earth fault relay
c. Bus under voltage relay with timer
d. No Voltage relay

5.2.5. INTER LOCKS

5.2.5.1. For Bus-coupler closing when any bus is having shut-down: -

a. Check Bus coupler breaker is open & in service position
b. No Voltage relay (on Bus section) has operated & ACB INCOMER (either I/C-1 for Bus Section-I or I/C-2 for Bus Section-II) on that Bus is Open
c. Lockout relay of both Incomers (on each bus) are not operated.
d. Voltage on the other bus is healthy.

5.2.5.2. For other Incomer (I/C-2) to close: -

a) Hard-wire check for I/C-1 (i.e. other incomer of that bus) and Bus-coupler of that bus are open & Lockout relay not operated.

5.2.6. Incomer modules shall be interlocked with their upstream HT breaker such that they can be closed only when upstream breaker is closed and line voltage available and shall trip automatically when upstream breaker is tripped.

5.3. Technical Requirement for Outgoing Feeders

5.3.1. Supply of ACB / MCCB / MPCB/ MCB for OG shall be as follows

OG feeder Rating	Requirement
< 63 A	MCB
>63 A and < 400A	MCCB
> 400A	ACB
For generating station Motor rated > 110kW Motor rated < 110kW	 ACB MPCB with DOL Starter
For receiving station Motor rated > 50 kW Motor rated < 50 kW	 MCCB with Star Delta Starter MPCB with DOL Starter

5.3.2. All above feeders shall be provided with 2 no. auxiliary potential free contacts for giving feeder status to SCADA /SAS.

5.4. MAIN BUSBARS

5.4.1. Material of main and tap off busbars shall be of electrical grade tinned copper/aluminium conforming to relevant standards.

5.4.2. Busbars shall be rated in accordance with the service conditions and the rated continuous and short time current ratings. Maximum temperature of the main busbars and busbar connections, under operating conditions, when carrying rated normal current at rated frequency shall not exceed 90/105 Deg. C for non-silver plated / silver plated joints/connections. Busbar temperature limits shall be adhered to without forced cooling method.

5.4.3. For main busbar current rating shall be 1.25 times the incomer breaker rating. For tap off busbars, the current rating shall be at least equal to total of corresponding connected breaker(s) rating.

5.4.4. All busbar joints and bus tap joints shall preferably be silver faced. The current density in copper busbar must be below 1.2A/mm^2 to prevent oxide formation. The current density in aluminium busbar must be below 0.8A/mm^2 to prevent oxide formation

5.5. BUSBAR AND SLEEVS:

5.5.1. The busbars shall be sleeved with flame retardant heat/cold shrinkable sleeve. All joints shall be provided with removable shrouds.

5.5.2. The busbar sleeves, shrouds material shall be suitable for continuous operating temperature of 5 Deg. C higher than the maximum permissible operating temperature of busbars / joints.

5.5.3. The sleeving material shall not crack, peel or loosen on the busbars when subjected to thermal cycling during service and shall be of such quality as not to require replacement for life of switchgear. It shall be possible to remove and refix the shrouds repeatedly without damaging them.

5.5.4. Bus bars shall be located in air insulated enclosures and segregated from all other compartments of the cubicle. Direct access or accidental contact with bus bars and primary connections shall not be possible.

5.6. AIR CIRCUIT BREAKERS (ACB)

5.6.1. Local manual operation with manual spring charging mechanism. Tripping of the breaker through protective relays shall be possible.

5.6.2. Draw out type with under-voltage, over-load, short-circuit & earth-fault protections with time delay feature.

5.6.3. Circuit breaker shall be power operated by a motor charged spring operating mechanism. It shall be strong, rigid, positive and fast in operation.

5.6.4. Main poles of the breakers shall be such that unless otherwise specified, the maximum difference between instants of contacts touching during closing shall not exceed half cycle of rated frequency.

5.6.5. Main poles of the breakers shall operate simultaneously. There shall be no objectionable rebound and the mechanism shall not require any critical adjustment.

5.6.6. Mechanism shall be such that failure of any auxiliary spring shall not prevent tripping and will not cause tripping or closing operation of the power operated closing devices. When the circuit breaker is already closed, failure of any auxiliary spring shall not cause damage to the circuit breaker or endanger the operator.

5.6.7. A mechanical indicator shall be provided to show open and closed positions of breaker. It shall be located in a position where it will be visible to the operator standing on the front of the switch-gear with cubicle door closed.

5.6.8. The closing release shall operate correctly at all values of voltage between 85% and 110% of the rated voltage. A shunt trip shall operate correctly under all operating conditions of the circuit breaker up to the rated breaking capacity of the circuit breaker and all values of supply voltage between 70% and 110% of rated voltage. The trip coils/relay shall be wired to facilitate supervision of the coils. (Electronic Trip coil should not be provided). Control voltage of the breaker must match station DC control voltage.

5.6.9. Mechanical trip and close devices shall be provided for manual operation of the breaker. Access to mechanical closing device shall be only after opening the cubicle door. However, the mechanical trip device shall be brought out to the front of the cubicle door.

5.6.10. Working parts of the mechanism shall be of corrosion resistant material. Bearings which require grease shall be equipped with pressure type grease fittings. Bearing pin, bolts, nuts and other parts shall be adequately pinned and locked to prevent loosening or changing adjustment with repeated operation of the breaker.

5.6.11. Auxiliary switches mounted on the fixed portion of the cubicles and directly operated from the breaker operating mechanism on each breaker having 8 'NO' and 8 'NC' potential-free contacts rated for 10amps, 240V AC and 0.5amps (inductive breaking) 220V / 110V DC shall be provided.

5.6.12. The contacts shall be in addition to those utilized in the control circuit of each breaker and shall be exclusively meant for the OWNER'S use in external interlocks and controls.

5.6.13. For breaker control, 2 nos. 220V Dc control supply shall be provided with a auto/manual selection for changing over to either supply. Necessary voltage monitoring contactors, indication lamps shall be provided.

5.6.14. Local / remote selection facility shall be provided with manual & electrical operation in local mode and only electrical operation in remote mode. Tripping of the breaker through protective relays shall be possible in both local & remote positions of selector switch.

5.6.15. Red, Green and Amber lamps be provided to indicate Closed, Open and Trip conditions of the ACB.

5.6.16. Electrical interlocking facility shall be provided for all the breakers.

5.6.17. General technical parameters for ACBs:

	ACB:		
1.0	Current, Voltage, frequency & Phases		As per SLD, 415V , 50 Hz , 3 Phase
2.0	Rated operating duty		B – 3 min – MB – 3 min – MB
3.0	Rated breaking capacity	KA(RMS)	50KA
4.0	Rated making capacity	KA (peak)	110KA
5.0	Protections		Micro-processor-based Overload, short-circuit & earth fault release, No-volt release, trip coil
6.0	Standard applicable		IS 8828 / IS 13947
7.0	Energy meter to be provided on all Incoming feeders & bus couplers		Multi-Function Meter – Satec make, model no. PM130 EH+
8.0	Minimum No Aux Contacts		8NO + 8NC
9.0	Control Voltage: Spring Charging Motor Tripping / Closing		220V / 110 V DC (as per site control voltage)
10.0	Emergency manual operation for Spring Charging, Closing, Tripping		Required

5.6.18. All Incomer / outgoing feeder modules shall be operated in local mode. MCCBs shall be provided with separator links. List of feeders & rating shall be as per project specific SLD.

5.7. Spring Operated Mechanism

5.7.1. Spring operated mechanism, shall be complete with motor, opening spring, closing spring with limit switch for automatic charging and all necessary accessories to make the mechanism a complete operating unit.

5.7.2. 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 to the motor, at least one open-close-open operation of the circuit breaker shall be possible.

5.7.3. Breaker operation shall be independent of the motor which shall be used solely for compressing the closing spring.

5.7.4. Closing action of the circuit breaker shall compress the opening spring ready for tripping.

5.7.5. When closing springs are discharged, after closing a breaker, closing springs shall automatically be charged for the next operation.

5.7.6. Motor shall be such that it requires only about 30sec for fully charging the closing spring. Motor shall be rated for 220V/110V DC and shall operate satisfactorily at all values of voltage between 80% to 110% of rated voltage. Motor shall be protected against overloads and stalling.

5.7.7. Mechanical indicators to indicate charged and discharged condition of spring shall be provided.

5.7.8. Alternate means shall be provided to charge the closing springs manually when power supply to motor is not available.

5.8. Operating Mechanism Control

5.8.1. Operating mechanism shall normally be operated by remote electrical control when the breaker is in "Service" position. Electrical tripping shall be performed by shunt trip coils. Provision shall be made for local electrical control when the breaker is in "Test" position by a control switch on the switchgear cubicle door. Also, "Local/Remote" selector switch lockable in "Local/Remote" position shall be provided on the cubicle door. 'Red' and 'Green' indicating lamps shall be provided on cubicle door to indicate breaker close and open positions. Breaker "Service" and "Test" positions shall be indicated by separate indicating lamps on the cubicle door, in case mechanical indication of "service" and "Test" positions are not available on the cubicle door.

5.8.2. The mechanical trip and close devices shall be provided on the breakers in addition to above.

5.8.3. The circuit breaker shall be draw-out type and it shall have test, service and isolated positions. In test position, the circuit breaker shall be capable of being tested for operation without energizing power circuits. At least 8 NO + 8 NC spare contacts for owner's usage shall be wired to the terminal block after fully utilising for protection, interlocking, annunciation, etc.

5.8.4. Withdrawal of circuit breaker shall not be possible unless it is in open position and operation of circuit breaker shall not be possible unless it is fully in-service position or is fully in test position and drawn out position.

5.8.5. Each circuit breaker cubicle shall be provided with the following minimum standard accessories:

a. One control switch 'Trip-Neutral-close' spring return to neutral position

b. One control selector switch 'Local-Remote' stay put type & lockable switch.

c. Indicating lamps:

- Red' for breaker 'ON' indication and trip coil supervision.
- 'Green' for breaker 'OFF' indication.
- 'Blue' for breaker in 'service' position.
- 'Red' for breaker ON indication at the back of the switchgear at cable box door.
- 'White' for breaker closing spring 'Charged'.
- 'Amber' supervision lamp for lock out relays.

The indicating lamps shall be self-coloured clustered LED type. All indicating lamps shall be on DC. Trip Supervision Relay (TSR) shall be provided.

5.8.6. Castle key interlocks shall be provided to prevent opening of cable compartment door when breaker is closed and bus bar compartment when any of the incomers to bus are closed.

5.8.7. Electrical Anti-pumping feature

5.8.8. Anti-pumping feature shall be provided with Anti-Pumping Relay. Contactor shall not be used for this function.

5.8.9. Spring charging / 52a contact shall be used in Anti-pumping circuit.

5.8.10. The Anti-pumping scheme shall be designed such a way that it shall pass the test as per the procedure given below:

a. Breaker is in open position.
b. Trip command shall be kept persisting.
c. Give close command by TNC switch. With this command, Breaker will close & Trip. Further command for breaker closing should not be issued and breaker shall remain in open condition.

5.8.11. DC supply Selector switch with the positions, viz., Source-1 and Source-2. In case of failure of any one source (say source 1) switch shall be changed over to the other source (Source 2) and complete DC supply requirement will be fed from the other source.

5.8.12. One breaker operation counter shall be provided.

5.8.13. Transducers required for remote monitoring shall be mounted on the respective switchgear. All transducers (current and voltage) shall be self-powered.

5.8.14. Interposing relays for remote 'On and OFF' commands shall be mounted on the respective modules of the switchgear. The interposing relay shall be rated for 0.5 Amp breaking at 220V /110V DC and 6 Amp making and continuous current at 220V / 110V DC.

5.9. MCCBs/MPCBs/MCBs:

5.9.1. MCCBs shall be hand operated, air break, heavy duty, quick make, quick break type conforming to applicable standards.

5.9.2. MCCBs shall be provided with overload/ short-circuit protective device and handle (as hand operated). The tripping time of the MCCB's shall be less than 20 msec.

5.9.3. It shall be the responsibility of the VENDOR to fully coordinate the overload and short circuit tripping of the MCCBs with the downstream fuses to provide satisfactory discrimination.

5.9.4. Switch handle shall have provision for locking in both fully open and fully closed positions.

5.9.5. All outgoing feeder modules shall be operated in local mode. MCCBs / MCBs shall be provided with separator links.

5.9.6. All MCCBs/MPCBs/MCBs shall be provided with 2 nos. potential free Aux contact for status indication to SCADA.

1.	**AC MPCB / MCCB / MCB:**	
1.0	Voltage, frequency & Phases	415V , 50 Hz , 3 Phase
2.0	Current	As per load list
2.0	Rated operating duty	B – 3 min – MB – 3 min – MB
3.0	Rated breaking capacity	50KA(RMS)
4.0	Rated making capacity	110KA (peak)
5.0	Protections	Overload, short circuit (variable setting) & earth fault release
6.0	Standard applicable	IS 8828 / IS 13947

2.	**DC MCCB:**	
1.0	Voltage, frequency & Phases	220 V / 110V, 2Pole and 48V, 2 Pole
2.0	Rated breaking capacity	10KA (peak)
3.0	Rated Making Capacity	By bidder
4.0	Protections	Overload, Short circuit (variable setting) & earth fault release
3.0	Standard applicable	IS 13947

5.10. Contactors:

Contactors shall be of the full voltage, direct on-line, air break, single throw, electro-magnetic type unless otherwise specified. The coils should be rated for continuous duty at 110% the applied voltage.
Contactors shall be provided with at least 2 'NO' and 2 'NC' auxiliary spare contacts.

5.11. Fuses:

5.11.1. Fuses generally shall be of HRC cartridge link type, mounted on plug-in type of fuse bases having a rupturing capacity of 80kA. Fuses up to 63A may be of HRC cartridge screw-cap, D-type having a rupturing capacity of not less than 16kA at 250V DC.

5.11.2. Fuses shall be provided with visible operation indicators to show that they have operated.

5.11.3. All the accessible live connections shall be adequately shrouded, and it shall be possible to change fuses with the circuit alive, without danger of contact with live metal.

5.12. Control & Auxiliary Power Supply:

5.12.1. All control equipment shall be suitable for operation on 220V/110V DC ungrounded system as detailed in the specific requirements.

5.12.2. Control supply for the ACBs and the associated Protection relays shall be 220V/110V DC.

5.12.3. Separate circuits with switches, fuses etc. of adequate rating shall be provided for control of space heater, lighting etc.

5.12.4. The tap off for control transformer feeding space heating load shall be taken from the line side. All control transformers shall have adequately rated MCBs for isolation. The status feedback of the MCBs shall be available through potential free aux contacts.

5.13. Instruments & Protective Relays Indicating Instruments:

5.13.1. Unless otherwise specified, all electrical indicating instruments shall be 96 mm square, with 90 degrees scale. They shall be suitable for flush mounting on vertical panels and inclined faces of desks whose inclination from horizontal or vertical shall not exceed 20-degree C.

5.13.2. Instrument dials shall be white with black numerals and lettering. Knife-edge pointers and parallax free dials shall be preferred. Instruments shall be provided with non-reflecting glass.

5.13.3. Instruments shall have accuracy class of 1 or better. The design of the scales shall be such that it can read to a resolution corresponding to 50% of the accuracy class index.

5.13.4. Digital Type meters having multifunction capability will be provided. In case of multifunction meters, separate indicating instruments may not be required.

5.13.5. Ammeters for motor feeders shall have compressed extended scale to read up to six to nine times the rated current of the motor.

5.13.6. Incomer metering shall be 3-phase 4-wire to ensure that the single-phase loads are balanced between the three phases.

5.13.7. Bus PT and line PT shall be provided on each bus and incomer for synchronizing, protection, metering and interlocks as required.

5.14. Revenue / Energy Metering Instruments:

5.14.1. Meters shall be electronic type meters that collect, process and store electrical parameters, energy use and demand data on a time of the day or demand basis. Meters shall measure all electrical parameters like Voltage, Current, Watt, Watt-hours, VAR, VAR hours and Power factor in all phases. Meters shall preferably be of accuracy class 1 complying with CEA guidelines.

5.14.2. Watt-hour and VAR-hour measurement shall be suitable for unbalanced loads in three phase three-wire circuits. They shall be suitable for flush mounting or semi-flush mounting on vertical panels with only flanges projecting outside with back connected terminals.

5.14.3. The meters shall be suitable for operation from the secondary of CTs and VTs. They shall be provided with a separate test block for the testing of the meters without disturbing the CT and PT secondary connections.

5.14.4. Meters shall provide enhanced LCD display which, shall include but not limited to (a) Six digits display of metered quantities and constants (b) Potential indication for each phase. The display can be programmed to scroll through the sequence of programmed display items in any sequence.

5.14.5. Meter shall have non-volatile memory such that in the event of line voltage interruption, the meter circuit immediately transits to a mode of orderly shutdown and data gets preserved. When power is restored data collection resumes.

5.14.6. Meters shall be equipped with communications interface with MODBUS or any other open type of protocol, which permits meters to be read or reprogrammed from remote locations.

5.14.7. Meters shall have tamper detection facility. Meters shall detect any possible form of tamper like PT removal/CT reversal etc & shall store date/time of tamper and restoration in the meter. Further, it shall have provision of seals. Meter shall also have a feature for working satisfactorily in absence of neutral.

5.14.8. Meters shall have RS 485 port for communications.

5.15. Protective Relays:

5.15.1. All protection relays shall be of numerical type (IED's) with fibre optic communication interface and compliant to IEC-61850 protocol. It shall be possible to fully utilize the metering, protection and control features of the numerical relays. They shall have programmable logic facility with built-in timers. Apart from the status of operation of the protection functions inbuilt in the relay, the binary inputs of the relay shall be

suitable for taking the operation of other non-communicable relays (if any) in the protection panel to PLC (if any). The numerical relays shall be selected with suitable number of binary/analog inputs and outputs. Events shall be time stamped in the protective relays with a resolution of 1 ms. Time synchronizing pulse in SNTP format shall be feasible for transmission to all devices when connected in a network.

5.15.2. Relay cases shall have adequate number of terminals for making potential free connections to the relay coils and contacts including spare contacts. Relay case size shall be so chosen as not to introduce any limitations on the use of available contacts of the relay due to inadequate number of terminals.

5.15.3. Provision shall be made for easy isolation of trip circuits of each relay for the purpose of testing and maintenance.

5.15.4. Relays shall be electrically resettable type. Backlit pushbutton shall be provided for resetting the relay.

5.15.5. Cross ferruling shall be provided.

5.15.6. Provision shall be made for easy isolation of trip circuits of each relay for the purpose of testing and maintenance.

5.15.7. Relay Contacts / Output: Relays when specified or required in specific application shall have electrically independent output contacts for the following purposes:

a. Tripping circuit.

b. Remote/local annunciation.

c. Data Acquisition System.

d. Spare (for event recorder, etc.)

5.15.8. Protective relays shall be suitable for secondary rating of CTs and when drawn out should short CT secondary which should not even momentarily get open circuited.

5.15.9. All breakers having inbuilt protection shall also have settable time delay. Also, all protections shall be implemented with hard wired logics.

5.16. Indicating LEDs:

Indicating LEDs shall be Cluster LED with control fuse shall be provided for indication RYB phase of incomer supply and for outgoing feeders for ON/OFF/Trip indication.

5.17. Space Heater:

Each switchgear cubicle shall be equipped with heaters to prevent moisture condensation within the enclosure and shall be complete with switch fuse unit for power supply. Heaters and switch fuse units shall be suitable for continuous operation on 240V, 1 phase, 50 Hz AC supply. Heaters shall be provided with thermostats for temperature control purpose.

240V, 1 phase switchgear/ panel space heating – 1 no. on each bus.

240V, 1 phase motor space heating supply module – 1 no. on each bus.

5.18. Interior Lighting and Receptacle:

Control cabinet shall be provided with a 240 V, 1 phase, 50 Hz, 40 W preferably LED lighting fixture for interior illumination controlled by door operated a 'ON-OFF' switch and 240 V, 1 phase, 6/16 amp, 3 pin receptacle. Power source for interior lighting and receptacles shall be completely independent of control power source.

5.19. Cabinet Internal Wiring / Accessories:

5.19.1. Control cabinets shall be supplied completely wired, ready for the Owner's external connections at the terminal blocks. All wiring shall be carried out with 1100V grade, FRLS PVC insulated with anti-rodent treatment, stranded conductors. Power circuits shall be wired with stranded copper conductors of adequate sizes to suit the rated circuit current the minimum size shall be 4 sq.mm. Control, alarm and indication circuits shall be wired with stranded copper conductors of at least 2.5 sq.mm for CT, PT and 1.5 sq.mm for the other circuits.

5.19.2. Engraved identification ferrules marked to correspond with the wiring diagram shall be fitted at both ends of each wire. All wiring shall be terminated on terminal blocks by means of rounded type crimped lugs. Forked type lugs shall not be used. Not more than 2 wires shall be terminated on each terminal. Terminals shall be adequately rated for the circuit current; the minimum rating shall be 20A.

5.19.3. Terminal Blocks shall be of disconnecting type 1100V grade, 10 Amps rated complete with insulated barriers. Terminal blocks for CTs and PTs shall be provided with test links and isolation facilities and CT terminals shall have short-circuiting and earthing facilities. All spare contacts and terminals of the cubicle mounted equipment and devices to be wired to terminal blocks ready for Owner's external cable connections.

5.19.4. Terminal blocks for CT and PT secondary leads shall be provided with test links and isolating facilities. Also, CT secondary leads shall be provided with short-circuiting and earthing facilities.

5.19.5. The terminal blocks shall be suitable for connecting the following conductors of the cables on each side:

a. All circuits except CT circuits: Minimum of 2.5 mm2 copper

b. CT circuits: Minimum of 4 mm2 copper

5.19.6. There shall be a minimum clearance of 250 mm between the first row of terminal blocks and the associated cable gland plate. Also, the clearance between two rows of terminal blocks shall be a minimum of 150 mm.

5.20. Earthing:

5.20.1. An earthing bus shall be provided and extended throughout the length of the switchgear. It shall be bolted to the framework of each unit and brazed each breaker earthing contact bar.

5.20.2. The earth bus shall have sufficient cross section to carry the momentary short circuit and short time fault current for at least one second or higher without exceeding maximum allowable temperature rise causing damage to the switchgear (LV – 50kA for 1 Sec.).

5.21. Front Panel Controls & Indications:

5.21.1. For incomer breaker modules

5.21.1.1 Controls / Instrumentation

Local / Remote control

Auto / Manual control

CT & PT shall be of 0.5 classes for metering

5.21.1.2 Indications: Provision shall be local & potential free contact for remote indication.

a. ON/OFF/Trip LEDs
b. R Y B indications
c. Provision On/OFF/Trip status indication for Remote SCADA (Potential free contacts)

5.21.1.3 Meters

a. Ammeter on Y-phase
b. Voltmeter
c. MFM meter

5.21.1.4 Protection:

a. Overload, Short circuit
b. Earth fault relay.
c. No volt

All protection relays shall be of numerical type (IED's) with fibre optic communication interface and compliant to IEC-61850 protocol.

5.21.2. For outgoing feeder modules

5.21.2.1 Controls / Instrumentation: Local control is to be provided.

5.21.2.2 Indications: Provision shall be local & potential free contact for remote indication.

a. ON/OFF/Trip LEDs
b. Provision On/OFF status indication for Remote (Potential free contacts) for all feeders with group alarm wiring.
c. MFM Meter

5.21.2.3 Overload and Short circuit protection for the Outgoing feeders shall be provided.

5.21.3. Local / remote annunciation facility shall be provided.

5.22. Constructional Features

5.22.1. The switchgear shall be indoor, modular type, compartmentalized, metal enclosed, floor mounted of uniform height and made up of the requisite vertical sections, dust and vermin proof construction with degree of protection IP-54 for indoor and IP 55 for outdoor.

5.22.2. Adjacent switchgear cubicles shall be provided with side sheets on either side to ensure isolation. The Switchgear shall be extendable on either side by addition of vertical sections.

5.22.3. The bottom of the switchgear shall be fully covered by sheet steel. Removable Gland plates shall be provided for Power and Control cables. The gland plates shall be 3mm thick for breaker cubicles and 2mm thick for other cubicles. All gland plates shall be of non-magnetic material.

5.22.4. Each switchgear cubicle shall be fitted with a label in the front and back of the cubicle indicating application, rating and duty. Each relay, instrument and other devices shall be provided with labels.

5.22.5. The frame shall be fabricated using suitable mild steel structural sections or pressed and shaped cold rolled sheet steel of thickness not less than 2.5 mm.

5.22.6. The frames shall be sheet steel enclosed and shall be dust, weather and vermin proof providing a degree of protection of IP 54 for indoor use and IP 55 for outdoor use. Sheet steel used shall be cold rolled and at least 2.5 mm thick and properly braced to prevent wobbling.

5.22.7. Control cabinets shall be provided with hinged door(s) with padlocking arrangement suitable for use of Lock out Tag out (LOTO) equipment. The doors shall move in the horizontal plane and handles for the switches shall be on the door itself. Only one door shall be provided for the switching and fuse chamber. Operating devices shall be incorporated only in the front of the switchgear. No equipment requiring operation shall be located less than 250mm above ground level.

5.22.8. Doors, removable covers and plates shall be gasketed all around with neoprene gaskets. All the accessible live connections shall be shrouded, and it shall be possible to change the individual fuses, switches, MCCBs without danger of contact with live metal.

5.22.9. A suitable Mechanical Door Interlock shall be provided such that it shall be possible to open the cubicle door only when the switch is in 'OFF' position. It shall not be possible to put the switch in 'ON' position with the door open.

5.22.10. All live parts shall be provided with at least phase to phase and phase to earth clearances in air of 30 mm and 30 mm respectively. Insulating Barriers to be provided if the above clearances are not met.

5.22.11. Adequate interior cabling space and suitable removable cable gland plates shall be provided. Necessary number of cable glands shall be supplied and fitted on to this gland plate. Cable glands shall be screwed-on type and made of brass.

5.22.12. Two earthing terminals shall be provided to suit the Owner's earthing conductor. Panel earthing connection to existing grid shall be done by bidder.

5.22.13. The circuit breakers shall be fully draw out type with distinct service, test and isolated positions. In the test position, it should be possible to test the operation of the module without energizing the power circuits. Locking facilities in service, test and isolated positions to be included.

5.22.14. Four nos. 'NO' aux contacts shall be provided for each service and test positions.

5.22.15. It shall be possible to draw out the withdrawable chasis without having to unscrew or unbolt any connection. The power and control connections shall be of the stab-in or sliding type. All draw-out contacts shall be of the self-aligning type.

5.22.16. The CTs shall be mounted on the fixed portion of the switchgear but not directly on buses or the breaker truck. CT wiring should not be done through sliding contacts.

The switchgear must have the following features:

5.22.17. The Individual feeder modules containing all associated Equipment enclosed in steel enclosure are integral multiples of basic unit size to provide flexibility in changes, if any.

5.22.18. A completely metal enclosed bus-bar compartment running horizontally and a vertical bus-bar compartment serving all modules in the vertical section.

5.22.19. A vertical cable alley covering the height, except horizontal bus-bar compartment with adequate width to be provided for MCC modules and the breaker-controlled modules.

5.22.20. Separate horizontal enclosures or enclosures separated by Hylem sheets to be provided for power and control buses with tap off connections to each section

5.22.21. Partition should be provided between the Bus bar compartment and Breaker Compartment. Insulation barrier to be provided to prevent direct access to busbar or any power circuit if the switchgear door is opened.

5.22.22. All bus bar & Jumper connections shall be of high conductivity copper / aluminium.

5.22.23. Higher size modules shall be placed in lower tier to facilitate cable entry and termination.

5.22.24. Painting: The panels shall be complete with wiring, earthing terminals and shall be duly degreased, derusted, phosphated, given two coats of red oxide primer and two coats of enamel-based paint of shade as indicated. The final finished thickness of paint film on steel shall not be less than 100 microns and shall not be more than 150 microns.

6. Layout Requirements for the equipment

ACDB shall be designed with single front configuration. However, the ACDB can be double front based on the site requirement.
The height of the panel shall not exceed 2200mm. In case of multiple panels, the distance between adjacent panels shall be either less than 200mm or more than 750 mm. GA of the ACDB shall be such that it is properly installed at available space with required statutory clearances.

7. Operational Requirements

7.1. OPERATIONAL REQUIRMENT

ACB shall be provided with the following interlocks: -

7.1.1 Withdrawal or engagement of ACB shall not be possible unless circuit breaker is open.

7.1.2 Operation of an ACB shall not be possible unless it is in service position, withdrawn to test position or fully drawn out. Plug extension shall be considered for testing the breakers in rack-out condition and same shall be disconnected after the breaker is drawn out to a specific distance.

7.1.3 ACB 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 / disconnector are withdrawn. Padlocking facilities shall be provided for locking the shutters positively in the closed position. It shall, however, be possible to open the shutters intentionally against spring pressure for testing purposes. Module cover locking arrangement shall have adequate mechanical strength to withstand forces due to internal arc.

7.1.4 The breaker carriage shall be earthed before the circuit breaker reaches the test position from fully withdrawn position. In case of breakers/ disconnector with automatic disconnecting type of auxiliary disconnects, the carriage shall be earthed before the auxiliary disconnects are made and the carriage earthing shall break only after the auxiliary disconnects break.

7.1.5 The closing and tripping circuits of each cubicle shall have the electrically interlocking arrangement with the other equipment if necessary.

7.1.6 Pad locking arrangement for isolation points shall be provided. It shall be possible to provide LOTO equipment on all isolation points.

7.2. MAINTENACE REQUIRMENT

Construction of ACDB and DCDB should be such that minimum maintanance is required on the equipement. Necessary maintanance procedure shall be specified clearly in detail in O&M manual.

8. Technical Parameters of Equipment including DATA SHEET

SL. NO.	DETAILS	UNIT	Tata Power Specification	By Bidder
1.1	Switchgear designations		As per SLD	
1.2	Single front or double front	SF/DF		
1.3	Applicable Standard		Refer Specs	
1.4	Fully drawout/semi drawout/Fixed	FD/SD/F	FD	
1.5	Total dimensions of each complete switchgear L x W x D	mm	By Bidder	
1.6.1	Width of each vertical section with cable alley	mm	By Bidder	
1.6.2	Width of cable alley only	mm	By Bidder	
1.7	Minimum clear space required			
	a) In front	mm	By Bidder	
	b) Back	mm	By Bidder	
1.8	Max. cubicle weight with components	kg	By Bidder	
1.9	Have all the feeders and components specified in enclosed Drawings and Data Sheets A - 3 been provided?		By Bidder	
2	**GENERAL PARTICULARS**			
2.1	Sheet steel			
	a) Cold rolled/Hot rolled		Cold rolled	
	b) Thickness :			
	i) Frames	mm	2.5	
	ii) Door	mm	2	
	iii) Rear cover	mm	2	
	iv) Side and top covers	mm	2	
	v) Panel partitions	mm	1.6	
2.2	Degree of protections provided by the enclosure (As per IS: 13947)		IP 54 for ID IP 55 for OD	
2.3	Earth busbar size	Sq.mm	50 x 6 sq mm, Copper	
2.4	**BUSBAR**			
	a) Material of busbars		Cu/Al	
	b) Section	Sq.mm	By Bidder	
	c) Continuous current rating under site conditions	A	As per SLD	

	d) Whether busbars have been insulated	Y/N	YES	
	e) Type of insulation	1.1kV grade	By Bidder	
	f) Temperature rise over the reference ambient when carrying rated current	°C	105	
	g) Material of busbar supports		By Bidder	
	h) Clearance in air :			
	i) Between phases	mm	30	
	ii) Between phases earth	mm	30	
	i) Short time rating (One Sec.)	kA	50	
	j) Momentary rating (peak)	kA	110	
3	**CIRCUIT BREAKERS**			
3.1	Maker's name		By Bidder	
3.4	Circuit breakers type (air break and or MCCB)		Refer SLD	
3.5	Rated voltage	V	415	
3.6	Rated operating duty		B-3Min-MB-3Min-MB	
3.7	Rated current	A	Refer SLD	
3.8	Derating factor for operation under site conditions		By Bidder	
3.9	Rated symmetrical breaking current at rated voltage. (Indicate power factor)	kA	50	
3.10	Rated peak making current	kA	105	
3.11	Rated short time withstand rating (for 1 sec.) (For MCCB, BIDDER to indicate the time)		As per SLD	
3.12	Operating mechanism type		Motor wound spring charged	
3.13	Limits of voltage for satisfactory operation of the following devices as a % of normal voltage			
	i) Operating mechanism	%	85% to 110% of rated voltage.	
	ii) Closing at normal voltage	%	85% to 110% of rated voltage.	
	iv) Trip coil	%	70% to 110% of rated voltage.	
3.14	Power required for closing at normal voltage	W	By Bidder	
3.15	Power required for tripping at normal	W	By Bidder	

	voltage			
3.16	Spring charging motor details :		By Bidder	
	i) Rating	kW	By Bidder	
	ii) Rated voltage	V, AC/DC	220V DC	
	iii) Spring charging	Sec.	By Bidder	
3.17	Microprocessor based Overload, Short circuit and Earth fault protection to be provided	YES/NO	YES	
3.2	Have electrical and mechanical anti-pumping features been provided	YES/NO	YES	
	Shunt Trip required	YES/NO	YES	
3.21	Have type test certificates been enclosed?	YES/NO		
3.22	Minimum no. of auxiliary contacts for ACBs		8NO + 8NC	
	Emergency Manual Operation required in addition to electrical operating devices:			
	i) For spring charging & Closing	YES/NO	YES	
	ii) For Tripping	YES/NO	YES	
4	**MCCBS**			
4.1	Moulded case circuit breakers to be provided		Suitable MCCB's/MPCB's considers by Bidder	
	A) for motor control circuits	YES/NO	YES	
	B) for other circuits	YES/NO	YES	
4.2	Voltage, frequency & no. Of phases		415V, 3ph, 50Hz	
4.3	Rated operating duty		S1	
4.4	Rated breaking capacity (at 415v 0.25 p.f.)	kA	50	
4.5	Rated making current	kA	105	
4.6	Rated current at site reference ambient temperature			
4.7	ON/OFF operation :			
	Manual	YES/NO	YES	
4.8	Releases required:			
	Overload	YES/NO	YES	
	Earth Fault	YES/NO	YES	
5	**AIR BREAK SWITCHES**			
5.1	Make		By Bidder	

5.2	Type		By Bidder	
5.3	Rated Voltage	V	415V	
5.4	Maximum prospective fault current withstands of composite unit of switch and fuse	kA (peak)	50	
6	**FUSES**			
6.1	Make			
6.2	Type		HRC	
6.3	Rated voltage	V	415	
6.4	Rated current for individual circuits to be provided as per requirements of protection coordination	YES/NO	YES	
7	**CONTACTORS**		NA	
7.1	Make			
7.2	Rated duty			
7.3	Rated Utilisation Category			
7.4	Rated (thermal) current provided as per specification	YES/NO		
7.5	Rated voltage of auxiliary contacts	V		
7.6	Rated voltage of coil	V		
7.7	Rated breaking capacity	Factor of rated current		
7.8	Rated making capacity	Factor of rated current		
7.9	No of auxiliary contacts:			
	I) Normally open			
	ii) Normally closed			
9	**CURRENT TRANSFORMERS**			
9.1	Make			
9.2	All other parameters of CT as per enclosed SLD/list	YES/NO	Refer SLD	
10	**VOLTAGE TRANSFORMERS**			
10.1	Make			
10.2	Ratio	V/V	As per SLD	
10.3	Output per phase	VA	As per SLD	
10.4	Accuracy class		As per SLD	
10.5	Over voltage factor		Continuous	

			1.2/1.5 times 30 Sec	
10.6	Class of insulation			
11	**CONTROL TRANSFORMERS**			
11.1	Make		By Bidder	
11.2	Ratio		By Bidder	
11.3	Class of insulation		Class B or better	
11.4	Rated output	VA	By Bidder	
12	**INSTANTANEOUS OVER CURRENT RELAY**		As per SLD	
12.1	Application (phase fault or earth fault)		phase fault & earth fault	
12.2	Make		By Bidder	
12.3	Type		Numerical	
12.4	Setting range		By Bidder	
13	**INVERSE TIME AND THERMAL OVER CURRENT RELAY**		As per SLD	
13.1	Application		As per SLD	
13.2	Make		By Bidder	
13.3	Type		Numerical	
13.4	Current setting range		By Bidder	
13.5	Time setting range at 10 times the current setting	Sec.	By Bidder	
14	**UNDERVOLTAGE RELAY**			
14.1	Make			
14.2	Type		Electromagnetic	
14.3	Voltage rating	V	220	
14.4	Setting range	V	By Bidder	
15	**AUXILIARY RELAYS AND TIMERS**			
15.1	Make		By Bidder	
15.2	Type		By Bidder	
15.3	Coil voltage	V	220V DC	
16	**CONTROL/SELECTOR SWITCH**			
16.1	Make		By Bidder	
16.2	Type designation		By Bidder	

17	**VOLTMETER**			
17.1	Make		By Bidder	
17.2	Type		90 deg Scale	
17.3	Accuracy class		2 or better	
18	**AMMETER**			
18.1	Make		By Bidder	
18.2	Type		90 deg Scale	
18.3	Accuracy class		2 or better	
19	**WATTMETER**			
19.1	Make		By Bidder	
19.2	Type		90 deg Scale	
19.3	Accuracy class		2 or better	
20	**INDICATING LAMPS**			
20.1	Make		By Bidder	
20.2	Type		Cluster type LED	
20.3	Voltage	V	220V DC	
20.4	Wattage of lamp	W	By Bidder	
21	**PUSH BUTTONS**			
21.1	Make		By Bidder	
21.2	No of contacts:			
	i) Normally open		2	
	ii) Normally closed		2	
21.3	Contact rating	A	1A @ 220V DC	
22	**SPACE HEATER**			
22.1	Make		By Bidder	
22.2	Rated voltage	V	230	
22.3	Heater output for each vertical panel	W	By Bidder	
22.4	Thermostat at setting °C		By Bidder	
23	**WIRING AND TERMINAL BLOCKS**			
23.1	Voltage grade	kV	1.1kV	
23.2	Insulation		PVC	
23.3	Minimum size of conductor for:			
	i) Power wiring	Sq.mm	2.5	

	ii) Control wiring	Sq.mm	1.5	
23.4	Type of terminal blocks:			
	i) For withdrawable Type		Stud	
	ii) For Fixed type		Stud	
23.5	Minimum current rating of terminal blocks	A	10	
23.6	Whether terminals for CT's have been provided with short circuiting facilities	YES/NO	YES	

9. Quality Requirements (including SQP and FQP)

9.1. The Bidder shall adhere to the Standard Quality Plan of Tata Power attached with this specification. The purpose is to ensure that the Bidder has interpreted the specified requirements correctly and that the FAT includes checking to the degree required by the user. The general philosophy shall be to deliver a system to site only after it has been thoroughly tested and its specified performance has been verified, as far as site conditions can be simulated in a test lab.

9.2. The purpose of Factory Acceptance Testing is to ensure trouble free installation at site. Prior to release for shipment of the equipment the Purchaser or his representative will witness Factory Acceptance Test (FAT) in which the system is checked against the specifications.

9.3. Type and routine tests certificates for all components made use in the Switchgear shall be furnished. Tests for components shall be as per relevant standard specifications.

9.4. System tests shall be performed on the completely assembled Switchgear panel. Type, routine and optional tests covered as mentioned in the SQP attached with this specifications shall be conducted. Type tests as per SQP are

9.4.1. Short circuit making and breaking tests of breakers

9.4.2. Rated short time current withstand & peak withstand test

9.4.3. Temperature rise test on bus bar & componenet contained in the metal enclosed switchgear

9.4.4. Degree of protection of panels

9.4.5. Electromagnetic compatibility (EMC)

9.5. Bidder shall incorporate all FAT comments prior to despatch. After Bidder confirms that all changes have been incorporated, Purchaser's Office will issue Despatch Clearance.

9.6. The Test Reports as indicated SQP as well as Test Certificates of OEM, third party, Bidder shall be submitted for approval / verification. The type test report shall not be more than 5 years old.

9.7. FAT and Despatch Clearance by the Purchaser shall not relieve the Bidder from complete responsibility for the total system and its performance subsequently.

9.8. Bidder shall furnish the Commissioning check list for Tata Power approval before commissioning the switchgear at Site. As such checklist shall cover site-specific tests including interconnections with field equipment and other systems. Apart from testing and commissioning,

9.9. Unstructured tests shall be employed as necessary, to verify overall system operation under field conditions.

9.10. Standard SQP is as follows:

9.10.1. Standard Quality Plan Document No: TPQAIT-QAXX-00-EX-SQP-105 REV.0

9.10.2. Standard Field Quality Plan Document No: TPQAIT-QAXX-00-EX-FQP-121 REV.0

Bidder shall confirm compliance to SQP during bid stage.

10. Inspection, Testing and Performance Requirements along with Warranty

The ACDB / DCDB shall be capable of trouble free operation under specified operating conditions. Under full load operation the temperature rise of busbars shall not exceed the specified temp. rise limits.

11. Mandatory Spares

The spares supplied shall be strictly interchangeable with parts for which they are intended for replacement. The spares shall be treated and packed for long storage (minimum 5 years) under the climatic conditions prevailing at the site.

11.1. Start-Up Spares

The start-up spares are those spares which will be required during start-up and commissioning of the equipment/systems, and until Final Take Over. It is the responsibility of the bidder to supply all the necessary spares as required until the equipment/systems are handed over to the Owner. An adequate stock of start-up spares shall be available at the site such that the start-up and commissioning of the equipment/systems, performance testing and handing over the equipment/systems to the Owner will be carried out without hindrance and delay. All start-up spares which remain unused after the taking over the sub-station shall remain the property of the Owner. The Bidder shall furnish the Schedule of Start-up Spares.

11.2. Essential Spares

Essential spares are those considered necessary by the owner for first three (5) years of normal sub-station operation. A list of such spares has been listed in the below mentioned table and the same shall be included in bidder's scope. When a particular item of spares is indicated as `percentage', it shall be considered as percentage of total number of that item of spares in the single equipment/system, unless specified otherwise and the fraction shall be rounded-off to the next higher whole number. Whenever the

item of spares has been indicated as `set' the same shall mean the supply for a single equipment/system. One set of spares for the particular equipment shall mean the total quantities of that particular spares for a single equipment e.g., `set' of Server, set of Gateway, shall include HMI, keyboard, mouse etc. The `set' shall however include all components required to replace that item of spares. The Owner reserves the right to buy any of the essential spare parts as considered necessary.

In case during start-up and commissioning certain essential spares are used up, the same shall be replaced within one (1) month without any commercial implications.

VENDOR shall furnish details for all below given essential spares as per the approved vendor document list.

Sl.No	Description	Quantity
1	Air circuit breaker complete with operating mechanism and truck mounted of each type and rating	1 No
2	MCCBs of each type and rating	1 nos.
3	MPCBs of each type and rating	1 nos.
4	Closing coils of each rating	2 nos.
5	Tripping coils of each rating	2 nos.
6	Fixed and moving contact assemblies of breaker of each rating (unit price refers to fixed + moving per pole)	2 nos.
7	Set of arc chutes for the circuit assemblies of breaker of each rating (unit prices refer to per pole prices)	1 No
8	Spring charging motors of each rating	1 No
9	Set of closing spring of each type	1 no.
10	Set of tripping spring of each type	1 no.
11	Busbar support insulators of each type (support insulators only without any fishplates)	10%
12	Auxiliary switch assembly, limit position switches, Local/remote selector switch, breaker control switches & other switches of each type and rating	10%
13	Numerical relays of each type used	1 each
14	Clustered type LED of each colour	10%
15	CTs of each ratio and type	1 each
16	VTs of each ratio and type	1 each
17	Control transformers of each rating	1 each
18	Multifunction meters of each type	1 each
19	Indicating meters of each type and rating	1 each
20	MCBs of each type and each rating	1 each
21	Transducers of each type and rating	1 each
22	Power contactors of each type and rating	1 each
23	Space heater of each type	1 each
24	Thermostat	1 each
25	Microprocessor based overload relays	10%
27	Flexible connector each type and rating (1-phase)	10%
28	Spare feeders of each rating	1 each

11.3. **Recommended Spares**

11.3.1. In addition to the spares mentioned above, the Bidder shall also furnish in his bid a list of recommended spares with unit prices. The Owner reserves the right to buy any of the recommended spare parts as considered necessary by him. The prices of recommended spares shall be consistent with those of start-up/essential spares. Purchase of these spare parts will be covered by a separate order or an amendment to the contract.

11.3.2. The Bidder shall provide a list of recommended spares for a period of five years from the date of Site Acceptance Test (SAT) and confirm that the shelf-life of these spares is such as to last for at least 7 years from the date of SAT.

11.3.3. The Bidder shall provide the MTBF of various components, sub-assemblies, assemblies etc. (recommended as spares) and the relationship between MTBF and spare quantities recommended.

11.3.4. The Bidder shall submit the product life cycle details of the all hardware offered under this RFP. The table below indicate the minimum requirement of the owner, bidder to include the spares, which are not part of this table, but required for maintenance and upkeep of the system.

11.4. **Special Tools & Tackles**

Bidder to consider and supply special tools and tackles required for erection, commissioning and maintenance of the offered system. After commissioning of the system all tools and tackles shall be handed over to Owner's Project/Maintenance team.

Sl. No	Description	Quantity
1	Circuit Breaker lifting trolleys	1 No
2		

12. Data Submission by Bidder

12.1. With the Bid

As part of the proposal, the BIDDER shall furnish the following drawings and data for scrutiny.

12.1.1. Control cabinet general arrangement drawing showing dimensioned views, cable entry locations, mounting details and foundation plan.

12.1.2. Data sheet as mentioned in section8.0.

12.1.3. Bill of materials listing equipment designation, make, type, ratings etc. of the various equipment mounted on the control cabinet.

12.1.4. Schedule of activities for drawing submission, drawing approval, inspection, delivery to be submitted along with offer.

12.1.5. Acceptance to SQP/SFP provided by owner

12.1.6. Type test reports for similar rated and similar MOC

12.1.7. Recommended spare list

12.1.8. List of tools and tackles

12.2. After award of contract

12.2.1. Technical Datasheet

12.2.2. GA Diagram of offered panel

12.2.3. Schematic Diagram

12.2.4. Bill of Material

12.2.5. Recommended Spares List

12.2.6. List of Tool & tackles

12.2.7. Manufacturing Quality Plan and Field Quality Plan

12.2.8. Instruction manual from the manufacturer for Operation & Maintenance of all major components like ACBs, MCCBs etc.

12.2.9. Type test reports for records

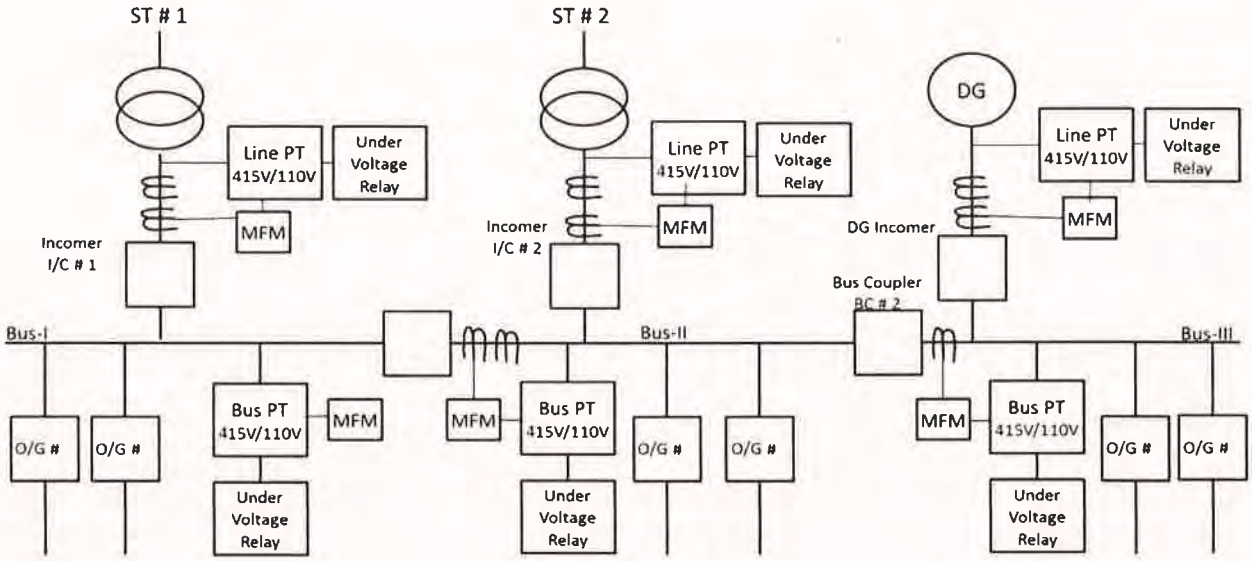
13. ANNEXURES

13.1. Annexure-I: Typical SLD for ACDB

13.2. Annexure-II: Standard Quality Plan Document No: TPQAIT-QAXX-00-EX-SQP-105 REV.0

13.3. Annexure-III: Standard Field Quality Plan Document No: TPQAIT-QAXX-00-EX-FQP-121 REV.0

Annexure I – Typical SLD for ACDB



Note: Please refer Section A for project specific SLD.

Section B

Technical Requirement of Fire Protection and Detection System

Chapter No 12

Standard Specification for Painting

THE TATA POWER COMPANY LIMITED

STANDARD

TECHNICAL SPECIFICATION

FOR

Standard Painting Specification for Fire Protection System

(DOCUMENT NO - ENGG/ P&L/STD-SPEC/ 05)

Tata Power

Project Engineering

R2	14/5/2024	Revised and issued for use	J Shinde	D Das	N Mishra
R0	13/8/2014	Issued for Info or Use	JSS	RSG	AJ
Rev. No	**Date**	**Description**	**Prepared By**	**Checked By**	**Approved By**

Contents

1. **Scope** 3
2. **Codes and Standards** 3
3. **Preparation of Surfaces** 3
4. **Primer Paint** 3
5. **Intermediate Paint** 3
6. **Finish Paint** 3
7. **Suggested Colour Codes for Painting** 3

1. Scope

1.1. This section covers the painting requirements for the equipment, structures, piping (including MS ERW and GI pipe) etc. and any other surface required to be painted in non saline environment.

2. Codes and Standards

2.1. Painting of equipment will be carried out as per the Contract documents indicated below and will conform to the relevant IS specification for the material and workmanship.

2.2. The following Indian Standards may be referred to for carrying out the painting job :

IS:5 : Colours for ready mixed paints and enamels

***3.* Preparation of Surfaces**

3.1. All surfaces to be painted will be thoroughly cleaned of all grease, oil, loose mill scale, dust, rust and any other foreign matter. Mechanical cleaning shall be performed by shot blasting method and same shall be adopted to clean the surfaces to SA 2 ½ as per BS:4232. Cleaning with solvents will be resorted to only in such areas where other methods specified above have not achieved the desired results. Cleaning with solvents will be adopted only after written approval of the OWNER / ENGINEER. For bought out items of electrical and instrumentation the surfaces will be pre treated through chemical cleaning (7 tank process).

4. Primer Paint

4.1. Zinc silicate primer (minimum 75 micron Dry Film Thickness - DFT) will be inorganic (Ethyl) self curing high built (Solid by volume minimum 60%) formulation as per BS: 5493 (Inorganic Zinc rich systems). Primer will be applied to ensure a continuous film without 'holidays'.

5. Intermediate Paint

5.1. Intermediate (Under) coat (minimum 75 micron DFT) will be of polyamide cured titanium di-oxide / micaceous iron oxide pigmented high performance (solid by volume minimum 60%) epoxy coating as per BS : 5493 (two pack chemical resistant under coats).

6. Finish Paint

6.1. Finish coat (minimum 75 micron DFT) will be of polyamide cured colored pigmented high performance (solid by volume minimum 60%) epoxy coating as per BS: 5493 (two pack chemical resistant finishes).

6.2. Final finish coat (minimum 25 Micron DFT) will be of polyurethane colour pigmented (solid by volume minimum 40%) as per BS : 5493 (two pack chemical resistant finishes).

6.3. All paints including primer will be of reputed brand / manufacturer and as approved by the engineer.

***7.* Suggested Colour Codes for Painting**

WorkinProgress Printed By: AMAN GUPTA - 31/Jul/2025 - A

S.No	Operation	Requirement	Standard	Reference Document / Acceptance Norm	Format of Record
A	B	C	D	E	F
ABOVEGROUND MS ERW BLACK PIPES					
1	PRE-PAINTING WORK - DOCUMENTAION				
1.1	Documents to be kept at site	A file containing the technical specifications for painting, approved general arrangement drawings, technical data sheets, QAP and OEM's application guide shall be kept at the site at all times.	-	As per approved formats / OEM's standard installation / trouble shooting manuals	Protocol
2	PRE-PAINTING WORK - SURFACE PREPARATION				
2.1	Surface preparation at site	Clean surface to remove rust, mill scales or any other foreign mater including salts, dust, oil and greases Cleaning to be carried out with steel wire brushes & scrapping paper to remove any residuals	As per specification	As per approved drawings / Specs / OEM's application guide	Protocol / Log Book
3	PAINTING				
3.1	Primer Paint	Zinc silicate primer of a minimum DFT of 75 microns as per specifications to be applied on a continuous film without breaks	BS:5493	As per approved drawings / Specs / OEM's application guide	Protocol / Log Book
3.2	Intermediate Paint	Polyamide cured titanium dioxide / micaceous iron oxide pigmented high performance coating of minimum 75 microns DFT	BS:5493	As per approved drawings / Specs / OEM's application guide	Protocol / Log Book
3.3	Finish Paint	Polyamide cured coloured pigmented high performance epoxy coating of minimum 75 micron DFT.	BS:5493	As per approved drawings / Specs / OEM's application guide	Protocol / Log Book
3.4	Final Finish Coat	Polyurethene coloured pigmented high performance epoxy coating of minimum 25 micron DFT.	BS:5493	As per approved drawings / Specs / OEM's application guide	Protocol / Log Book
3.5	Colour Shade	Structures / Platforms - Dark Admiralty Grey; IS:5 Grade 632	IS:5	As per approved drawings / Specs / OEM's application guide	Protocol / Log Book
		Piping for Fire Services (uninsulated / without cladding) - FIRE RED, IS:5 Grade 536	IS:5	As per approved drawings / Specs / OEM's application guide	Protocol / Log Book

WorkinProgress Printed By: AMAN GUPTA - 31/Jul/2025 - A

S.No	Operation	Requirement	Standard	Reference Document / Acceptance Norm	Format of Record
A	B	C	D	E	F
UNDERGROUND MS ERW BLACK PIPES					
1	DOCUMENTAION				
1.1	Documents to be kept at site	A file containing the technical specifications for painting, approved general arrangement drawings, technical data sheets, QAP and OEM's application guide shall be kept at the site at all times.	-	As per approved formats / OEM's standard installation / trouble shooting manuals	Protocol
2	SURFACE PREPARATION				
2.1	Surface preparation at shop	Clean surface to remove any residual for better finish by sand blast Cleaning to be carried out with sandblaster to achieve Sa2.5 as per BS:4232	BS:7079 Part A1 (BS:4232 has been superseded)	As per approved drawings / Specs / OEM's application guide	Protocol / Log Book
2.2	Surface preparation at site- (For Small portion of weld joint of two pipes)	Clean surface to remove rust, mill scales or any other foreign mater including salts, dust, oil and greases Cleaning to be carried out with power tool and scrapping with steel wire brushes to achieve approx. Sa2.5 as per BS:4232 After power tool and hand cleaning the sufrace shall be cleaned from loose dust and debris	BS:7079 Part A1 (BS:4232 has been superseded)	As per approved drawings / Specs / OEM's application guide	Protocol / Log Book
3	WRAPPING & COATING				
3.1	Primer Coat	Solvent based rubber modified synthetic chlorinated primer of a minimum DFT of 50 to 100 microns as per specifications to be applied on a continuous film without breaks	As per specification	As per approved drawings / Specs / OEM's application guide	Protocol / Log Book
3.2	Wrapping Tapes	The tape to be wrapped in accordance with the manufacturer's recommendations and a minimum overlap of 12 mm per single wrap. Two layers of tape of 4 mm thickness shall be wrapped.	IS:10221	As per approved drawings / Specs / OEM's application guide	Protocol / Log Book
GI PIPES					
1	DOCUMENTAION				
1.1	Documents to be kept at site	A file containing the technical specifications for painting, approved general arrangement drawings, technical data sheets, QAP and OEM's application guide shall be kept at the site at all times.	-	As per approved formats / OEM's standard installation / trouble shooting manuals	Protocol
2	SPOT GALVANIZATION				
2.1	Spot Galvanization at site - For small portion of weld joint of two pipes (Only for pipe dia above 50mm)	Spot Galvanizing by Zinc rich paint by using brush or spray	As per approved drawings / Specs / OEM's application guide	As per approved drawings / Specs / OEM's application guide	Protocol / Log Book

WorkinProgress Printed By: AMAN GUPTA - 31/Jul/2025 - A

S.No	Operation	Requirement	Standard	Reference Document / Acceptance Norm	Format of Record
A	B	C	D	E	F
3	PAINTING				
3.1	Primer Paint	Zinc silicate primer of a minimum DFT of 75 microns as per specifications to be applied on a continuous film without breaks	BS:5493	As per approved drawings / Specs / OEM's application guide	Protocol / Log Book
3.2	Intermediate Paint	Polyamide cured titanium dioxide / micaceous iron oxide pigmented high performance coating of minimum 75 microns DFT	BS:5493	As per approved drawings / Specs / OEM's application guide	Protocol / Log Book
3.3	Finish Paint	Polyamide cured coloured pigmented high performance epoxy coating of minimum 75 micron DFT.	BS:5493	As per approved drawings / Specs / OEM's application guide	Protocol / Log Book
3.4	Final Finish Coat	Polyurethene coloured pigmented high performance epoxy coating of minimum 25 micron DFT.	BS:5493	As per approved drawings / Specs / OEM's application guide	Protocol / Log Book
3.5	Colour Shade	Structures / Platforms - Dark Admiralty Grey; IS:5 Grade 632	IS:5	As per approved drawings / Specs / OEM's application guide	Protocol / Log Book
		Piping for Fire Services (uninsulated / without cladding) - FIRE RED, IS:5 Grade 536	IS:5	As per approved drawings / Specs / OEM's application guide	Protocol / Log Book
MAKE & MODEL NO. FOR PRIMER, INTERMEDIATE & PAINT					
4.1	Aboveground MS ERW Black & GI Pipes	Primer	Approved Make	Red Oxide Zinc Chromate Primer to IS 2074	
		Intermediate & Finish Paints	Approved Make	BP Syn Enamel to IS 2932 Fire Red as per IS 5-536	
4.2	Underground MS ERW Black Pipes	Primer	Approved Make	Pypstick	
4.3	Supports	Primer	Approved Make	Red Oxide Zinc Chromate Primer to IS 2074	
		Intermediate & Finish Paints	Approved Make	BP Syn Enamel to IS 2932 Fire Red as per IS 5-536	

WorkinProgress Printed By: AMAN GUPTA - 31/Jul/2025 - A

S.No	Operation	Requirement	Standard	Reference Document / Acceptance Norm	Format of Record
A	B	C	D	E	F
		Description	**Make**	**Model No/ Brand**	
Aboveground MS ERW Black & GI Pipes		Primer	Approved Make	Red Oxide Zinc Chromate Primer to IS 2074	
		Intermediate & Finish Paints	Approved Make	BP Syn Enamel to IS 2932 Fire Red as per IS 5-536	
Underground MS ERW Black Pipes		Primer	Approved Make	Pypstick	
Supports		Primer	Approved Make	Red Oxide Zinc Chromate Primer to IS 2074	
		Intermediate & Finish Paints	Approved Make	BP Syn Enamel to IS 2932 Fire Red as per IS 5-536	

WorkinProgress Printed By: AMAN GUPTA - 31/Jul/2025 - A

Section B

Technical Requirement of Fire Protection and Detection System

Chapter No 13

Standard Quality Plan for Various Equipments

ENGG/ P&L/STD-SPEC/ 017

TATA POWER	The Tata Power Company Limited Corporate Engineering-Quality Assurance Inspection & Testing			TATA
TPQAIT-QAXX-00-MX-SQP-038	STANDARD QUALITYPLAN FOR CI/CS (GGC) VALVES FOR WATER APPLICATION (UP TO 600lbs)			Date of issue:
Sr. No	COMPONENT / OPERATION	CHARACTERISTICS	TYPE / METHOD OF CHECK	REMARKS
1	2	3	4	5
1.0	MATERIAL: (As per approved Drawings/ Data sheets)			
1.1	Body,Bonnet,Seat, Wedge,Disc, Stem	Chemical & Physical properties	MTC Review	
		Visual & Dimensional	Visual & Measurement	
1.2	Gland, Fasteners, Handwheel etc.	Chemical & Physical properties, Dimensional	COC (Certificate Of Conformance)	
1.3	Body,Bonnet,Stem	NDT as applicable	Review of NDT report	For Stem, UT if Dia > = 40mm
2.0	INPROCESS INSPECTION:(As per Manufacturer regular practice)			
3.0	FINAL INSPECTION & TESTS: (Customer HOLD Points)#			
3.1	Body,Seat & Back seat*	Hydro-static test	Visual & Measurement (No leakage)	* Back seat test as per IS:778 & Specification requirement
3.2	Low pressure seat test for check Valves	Hydro-static test at 25% or differential pressure $	Visual & Measurement (No leakage)	$ Whichever is lower.
3.3	Performance test of complete assembly	Opening & Closing at least 3 times .	Visual & Measurement (Smooth operation)	
4.0	Document review & Issuance of IRN	Review of Qaulity dossier (*) & Inspection report	Review	(*) along with index.

NOTES

i). FOR MOTOR/ ACTUATOR OPERATED VALVES, TESTS AS INDICATED IN SL NO.3.0 SHALL BE PERFORMED WITH CONTRACT MOTOR/ACTUATOR ALONG WITH CURRENT DRAWN AND TIME TAKEN SHALL ALSO BE MEASURED.
ii). AIR SEAT TEST AT 5.9KG SHALL BE CARRIED OUT IF SPECIFICATION CALLS FOR .
A). STATUTORY REQUIREMENTS WILL BE COMPLIED BY THE CONTRACTOR.
B). ALL MATERIAL SHALL BE AS PER APPROVED DRAWINGS / DATA SHEET.
C). TATA POWER / ITS REP IDENTIFICATION STAMP ON MATERIALS WILL BE PRESERVED, IF REQD, SAME SHALL BE TRANSFERRED BY TATA POWER / ITS REP ONLY.
D). FINAL INSPECTION OF THE MAJOR ACTIVITIES ARE WITNESSED BY CLIENT AND IT IS HOLD POINT (AT THE DISCRETION TATA POWER)
E). MANUFACTURER SHALL PREPARE AND SUBMIT COMPLETE MANUFACTURING QUALITY PLAN IN PRESCRIBED FORMAT OR THEIR REGULAR FORMAT INDICATING THEIR REGULAR PRACTICES, TAKING CARE OF MINIMUM REQUIREMENT AS INDICATED ABOVE.
F). INSPECTION OF SPARES SHALL BE MANUFACTURED & INSPECTED AS PER APPLICABLE CLAUSES OF THIS QUALITY PLAN .SPARES OFFERED FOR INSPECTION SHALL BE PREFFERED ALONG WITH MAIN ITEMS (IF ORDERD).
G). AS PER SEPCIFICATION PROPER PAINTING & PACKING SHALL BE ENSURED BY VENDOR BEFORE SHIPMENT TO AVOID ANY TRANSIT DAMAGE.

Meant for (Internal Circulation / External – Stakeholders Circulation)

				13/02/15
Rev .No	First Issue.	PKG	PU	SS
R0	Reason for Revision	Prepared By & Date	Checked By & Date	Approved By & Date

TATA POWER	The Tata Power Company Limited Corporate Engineering-Quality Assurance Inspection & Testing	TATA
TPQAIT-QAXX-00-MX-SQP- 039	STANDARD QUALITY PLAN FOR HYDRANT VALVE	Date of Issue:

Sr. No	COMPONENT / OPERATION	CHARACTERISTICS CHECKED	TYPE / METHOD OF CHECK	REMARKS
1	2	3	4	5
1.0	MATERIAL:	(Generally in-line with manufacturer standard / technical specification)		
1.1	Body, Disc, Seat,Bonnet, Spindle, Hand Wheel	Chemical & Physical properties.	Review of MTC	
2.0	**INPROCESS INSPECTION:** (Generally in line with manufacturer standard)			
3.0	**Final Inspection : (Customer HOLD Point)**			
3.1	Complete Assembly	Dimensions (Body Thick & PCD of Flange)	Measurement	
3.2	Body & Seat	Hydrostatic Test	Visual and Measurement	No leakage
3.3	Performance Test	Flow test (Minimum 900 LPM)	Visual and Measurement	
4.0	Document review & Issuance of IRN	Review of final dossier (*) & Inspection Report	Review	(*) along with Index

NOTE

A). STATUTORY REQUIREMENTS WILL BE COMPLIED BY THE CONTRACTOR.
B). ALL MATERIAL SHALL BE AS PER APPROVED DRAWINGS / DATA SHEET.
C). TATA POWER / ITS REP IDENTIFICATION STAMP ON MATERIALS WILL BE PRESERVED, IF REQD, SAME SHALL BE TRANSFERRED BY TATA POWER / ITS REP ONLY.
D). FINAL INSPECTION OF THE MAJOR ACTIVITIES ARE WITNESSED BY CLIENT AND IT IS HOLD POINT (AT THE DISCRETION TATA POWER)
E). MANUFACTURER SHALL PREPARE AND SUBMIT COMPLETE MANUFACTURING QUALITY PLAN IN PRESCRIBED FORMAT OR THEIR REGULAR FORMAT INDICATING THEIR REGULAR PRACTICES, TAKING CARE OF MINIMUM REQUIREMENT AS INDICATED ABOVE.
F). INSPECTION OF SPARES SHALL BE MANUFACTURED & INSPECTED AS PER APPLICABLE CLAUSES OF THIS QUALITY PLAN .SPARES OFFERED FOR INSPECTION SHALL BE PREFFERED ALONG WITH MAIN ITEMS (IF ORDERD).
G). AS PER SEPCIFICATION PROPER PAINTING & PACKING SHALL BE ENSURED BY VENDOR BEFORE SHIPMENT TO AVOID ANY TRANSIT DAMAGE.

Meant for (Internal Circulation / External – Stakeholders Circulation)

Rev. No	Reason for Revision	Prepared By & Date	Checked By & Date	Approved By & Date
		20.02.15	20/02/15	25/02/15
R0	ISSUE FOR USE	PG	PU	SS

TATA POWER	The Tata Power Company Limited Corporate Engineering-Quality Assurance Inspection & Testing	TATA
TPQAIT-QAXX-00-MX-SQP-041	STANDARD QUALITY PLAN FOR SOLENOID VALVE	Date of Issue:

Sr. No	COMPONENT / OPERATION	CHARACTERISTICS CHECKED	TYPE / METHOD OF CHECK	REMARKS
1	2	3	4	5
1.0	MATERIAL:	(Generally in-line with manufacturer standard / technical specification)		
1.1	Housing Body	Chemical & Physical properties.	Review of MTC	
1.2	Piston, Pressure Disc	Chemical & Mechanical properties NDT	Review of MTC	
1.3	Enameled Copper Wires	Chemical & Physical properties.	Review of MTC	
1.4	Coil	1. Winding Resistance. 2. Insulation Resistance. 3. High Voltage test. 4. Coil pick up voltage & drop off Voltage. 5. Coil Temperature rise test. 6. IP degree verification. 7. Terminal connections.	Review of MTC	
2.0	**INPROCESS INSPECTION:** (Generally in line with manufacturer standard)			
3.0	**Final Inspection : (Customer HOLD Point)**			
3.1	Valve Assembly	Major Dimensions	Testing and Measurement	
3.2	Body & Seat leakage	Hydrostatic Test (by inbuild Actuator))	Testing and Measurement	No leakage
3.3	Performance (Discharge Test)	Flow rate check	Visual & Measurement	one of each type
3.4	Functional (Actuatation Test)	Operational (On - Off) Check minimum 5 times	Testing and Measurement	
4.0	Document review & Issuance of IRN	Review of final dossier (*) & Inspection Report	Review	(*) along with Index

NOTE

A). STATUTORY REQUIREMENTS WILL BE COMPLIED BY THE CONTRACTOR.
B). ALL MATERIAL SHALL BE AS PER APPROVED DRAWINGS / DATA SHEET.
C). TATA POWER / ITS REP IDENTIFICATION STAMP ON MATERIALS WILL BE PRESERVED, IF REQD, SAME SHALL BE TRANSFERRED BY TATA POWER / ITS REP ONLY.
D). FINAL INSPECTION OF THE MAJOR ACTIVITIES ARE WITNESSED BY CLIENT AND IT IS HOLD POINT (AT THE DISCRETION TATA POWER)
E). MANUFACTURER SHALL PREPARE AND SUBMIT COMPLETE MANUFACTURING QUALITY PLAN IN PRESCRIBED FORMAT OR THEIR REGULAR FORMAT INDICATING THEIR REGULAR PRACTICES, TAKING CARE OF MINIMUM REQUIREMENT AS INDICATED ABOVE.
F). INSPECTION OF SPARES SHALL BE MANUFACTURED & INSPECTED AS PER APPLICABLE CLAUSES OF THIS QUALITY PLAN .SPARES OFFERED FOR INSPECTION SHALL BE PREFFERED ALONG WITH MAIN ITEMS (IF ORDERD).
G). AS PER SEPCIFICATION PROPER PAINTING & PACKING SHALL BE ENSURED BY VENDOR BEFORE SHIPMENT TO AVOID ANY TRANSIT DAMAGE.

Meant for (Internal Circulation / External – Stakeholders Circulation)

		20.02.15	20/02/15	20/02/15
R0	ISSUE FOR USE	PG	PU	SS
Rev. No	Reason for Revision	Prepared By & Date	Checked By & Date	Approved By & Date

TATA POWER	The Tata Power Company Limited Corporate Engineering-Quality Assurance Inspection & Testing	TATA
TPQAIT-QAXX-00-MX-SQP-042	STANDARD QUALITY PLAN FOR SPRAY NOZZLE	Date of Issue:

Sr. No	COMPONENT / OPERATION	CHARACTERISTICS CHECKED	TYPE / METHOD OF CHECK	REMARKS
1	2	3	4	5
1.0	**MATERIAL:**	(Generally in-line with manufacturer standard / technical specification)		
1.1	Nozzle Body / Housing, Scroll	Chemical & Physical Properties	MTC Review	
2.0	**INPROCESS INSPECTION:** (Generally in-line with manufacturer standard)			
3.0	**FINAL INSPECTION & TESTS: (CUSTOMER HOLD POINTS)**			
3.1	Performance Test	Flow Rate & Spray Angle (K factor)	Measurement & visual	
4.0	Document review & Issuance of IRN	Review of final dossier (*) & Inspection Report	Review	(*) along with Index
NOTE	A). STATUTORY REQUIREMENTS WILL BE COMPLIED BY THE CONTRACTOR. B). ALL MATERIAL SHALL BE AS PER APPROVED DRAWINGS / DATA SHEET. C). TATA POWER / ITS REP IDENTIFICATION STAMP ON MATERIALS WILL BE PRESERVED, IF REQD, SAME SHALL BE TRANSFERRED BY TATA POWER / ITS REP ONLY. D). FINAL INSPECTION OF THE MAJOR ACTIVITIES ARE WITNESSED BY CLIENT AND IT IS HOLD POINT (AT THE DISCRETION TATA POWER) E). MANUFACTURER SHALL PREPARE AND SUBMIT COMPLETE MANUFACTURING QUALITY PLAN IN PRESCRIBED FORMAT OR THEIR REGULAR FORMAT INDICATING THEIR REGULAR PRACTICES, TAKING CARE OF MINIMUM REQUIREMENT AS INDICATED ABOVE. F). INSPECTION OF SPARES SHALL BE MANUFACTURED & INSPECTED AS PER APPLICABLE CLAUSES OF THIS QUALITY PLAN .SPARES OFFERED FOR INSPECTION SHALL BE PREFFERED ALONG WITH MAIN ITEMS (IF ORDERD). G). AS PER SEPCIFICATION PROPER PAINTING & PACKING SHALL BE ENSURED BY VENDOR BEFORE SHIPMENT TO AVOID ANY TRANSIT DAMAGE.			
Meant for (Internal Circulation / External – Stakeholders Circulation)				
		20.02.15	20/02/15	20/02/15
R0	ISSUE FOR USE	PG	PU	SS
Rev. No	Reason for Revision	Prepared By & Date	Checked By & Date	Approved By & Date

TATA POWER	The Tata Power Company Limited Corporate Engineering-Quality Assurance Inspection & Testing	TATA
TPQAIT-QAXX-00-MX-SQP- 043	STANDARD QUALITY PLAN FOR QUARTZ BULB DETECTOR (UL/ FM/ FOC/ VDS Approved source only)	Date of Issue:

Sr. No	COMPONENT / OPERATION	CHARACTERISTICS CHECKED	TYPE / METHOD OF CHECK	REMARKS
1	2	3	4	5
1.0	MATERIAL:	(Generally in-line with manufacturer standard / technical specification)		
1.1	Frame, Bulb Cap, Deflector	Chemical & Physical Properties	COC Review	
2.0	Review of Country of origin and Approval (UL/ FM/ FOC/ VDS) Cerificate of refered batch.			
3.0	FINAL INSPECTION & TESTS: (CUSTOMER HOLD POINTS) at Main Vendor/ Traders work place			
3.1	Body Hydro Test	Leak tightness	Measurement & Visual	at random (minimum) 5 %
4.0	Document review & Issuance of IRN	Review of final dossier (*) & Inspection Report	Review	(*) along with Index
NOTE	A). STATUTORY REQUIREMENTS WILL BE COMPLIED BY THE CONTRACTOR. B). ALL MATERIAL SHALL BE AS PER APPROVED DRAWINGS / DATA SHEET. C). TATA POWER / ITS REP IDENTIFICATION STAMP ON MATERIALS WILL BE PRESERVED, IF REQD, SAME SHALL BE TRANSFERRED BY TATA POWER / ITS REP ONLY. D). FINAL INSPECTION OF THE MAJOR ACTIVITIES ARE WITNESSED BY CLIENT AND IT IS HOLD POINT (AT THE DISCRETION TATA POWER) E). MANUFACTURER SHALL PREPARE AND SUBMIT COMPLETE MANUFACTURING QUALITY PLAN IN PRESCRIBED FORMAT OR THEIR REGULAR FORMAT INDICATING THEIR REGULAR PRACTICES, TAKING CARE OF MINIMUM REQUIREMENT AS INDICATED ABOVE. F). INSPECTION OF SPARES SHALL BE MANUFACTURED & INSPECTED AS PER APPLICABLE CLAUSES OF THIS QUALITY PLAN .SPARES OFFERED FOR INSPECTION SHALL BE PREFFERED ALONG WITH MAIN ITEMS (IF ORDERD). G). AS PER SEPCIFICATION PROPER PAINTING & PACKING SHALL BE ENSURED BY VENDOR BEFORE SHIPMENT TO AVOID ANY TRANSIT DAMAGE.			
Meant for (Internal Circulation / External – Stakeholders Circulation)				
		GOKSPL 20.02.15	Purnalli 20/02/15	20/02/15
R0	ISSUE FOR USE	PG	PU	SS
Rev. No	Reason for Revision	Prepared By & Date	Checked By & Date	Approved By & Date

TATA POWER	The Tata Power Company Limited Corporate Engineering-Quality Assurance Inspection & Testing	TATA
TPQAIT-QAXX-00-MX-SQP-044	STANDARD QUALITY PLAN FOR MS ERW PIPES (IS : 1239)	Date of Issue:

Sr. No	COMPONENT / OPERATION	CHARACTERISTICS CHECKED	TYPE / METHOD OF CHECK	REMARKS
1	2	3	4	5
1.0	**MATERIAL:**	(Generally in-line with manufacturer standard / technical specification)		
1.1	Raw Material Inspection (Plate / Coil)	Chemical & Physical Properties	MTC Review	
2.0	**INPROCESS INSPECTION:** (Generally in-line with manufacturer standard)			
3.0	**FINAL INSPECTION & TESTS: (CUSTOMER HOLD POINTS)**			
3.1	Final Product	Physical Properties as per IS1239	Sample testing ~~Report Review~~ as per IS	Random witness
3.2	Hydrostatic Test	Leakage Check (100 % by Manufacturer)	Measurement & visual	Random witness
3.3	Finish Pipes	Surface Condition, Strightness, Ovality , End Finish, Outer Dia. & Thickness, Length, Stamp	Measurement & visual	
3.4	Coating for Black Pipe	Uniformity of Coating	Measurement & visual	
3.5	Galvanizing (For Galvanized Pipe)	Coat thickness, Uniformity of Zn Coating, Adhesion Test, Peel of Test, mass of Zn, Free bore test.	Measurement & visual	As per IS 4736
4.0	Document review & Issuance of IRN	Review of final dossier (*) & Inspection Report	Review	(*) along with Index

NOTE

A). STATUTORY REQUIREMENTS WILL BE COMPLIED BY THE CONTRACTOR.
B). ALL MATERIAL SHALL BE AS PER APPROVED DRAWINGS / DATA SHEET.
C). TATA POWER / ITS REP IDENTIFICATION STAMP ON MATERIALS WILL BE PRESERVED, IF REQD, SAME SHALL BE TRANSFERRED BY TATA POWER / ITS REP ONLY.
D). FINAL INSPECTION OF THE MAJOR ACTIVITIES ARE WITNESSED BY CLIENT AND IT IS HOLD POINT (AT THE DISCRETION TATA POWER)
E). MANUFACTURER SHALL PREPARE AND SUBMIT COMPLETE MANUFACTURING QUALITY PLAN IN PRESCRIBED FORMAT OR THEIR REGULAR FORMAT INDICATING THEIR REGULAR PRACTICES, TAKING CARE OF MINIMUM REQUIREMENT AS INDICATED ABOVE.
F). INSPECTION OF SPARES SHALL BE MANUFACTURED & INSPECTED AS PER APPLICABLE CLAUSES OF THIS QUALITY PLAN .SPARES OFFERED FOR INSPECTION SHALL BE PREFFERED ALONG WITH MAIN ITEMS (IF ORDERD).
G). AS PER SEPCIFICATION PROPER PAINTING & PACKING SHALL BE ENSURED BY VENDOR BEFORE SHIPMENT TO AVOID ANY TRANSIT DAMAGE.

Meant for (Internal Circulation / External – Stakeholders Circulation)

		GOPPA 20.02.15	Pumalli 20/02/15	20/02/15
R0	ISSUE FOR USE	PG	PU	SS
Rev. No	Reason for Revision	Prepared By & Date	Checked By & Date	Approved By & Date

TATA POWER	The Tata Power Company Limited Corporate Engineering-Quality Assurance Inspection & Testing	TATA
TPQAIT-QAXX-00-MX-SQP-045	STANDARD QUALITY PLAN FOR MS SPIRAL WELDED PIPES (IS 3589)	Date of Issue:

Sr. No	COMPONENT / OPERATION	CHARACTERISTICS CHECKED	TYPE / METHOD OF CHECK	REMARKS
1	2	3	4	5
1.0	**MATERIAL:**	(Generally in-line with manufacturer standard / technical specification)		
1.1	Raw Material Inspection (Plate / Coil)	Chemical & Physical Properties	MTC Review	
1.2	Welding Process Qualification	Manufacturer Record	Review	
2.0	**INPROCESS INSPECTION:** (Generally in-line with manufacturer standard)			
3.0	**FINAL INSPECTION & TESTS: (CUSTOMER HOLD POINTS)**			
3.1	Final Product	Physical Properties as per IS 3589	Sample testing as per IS Report	Random witness
3.2	Hydro Test	Leakage Check	Measurement & visual	— do —
3.3	NDT on Weld	RT/ X-Ray (T - section and 100 mm from both ends of the pipes.	NDT Report	Pipe Dia 1600 mm and above
3.4	Finish Pipes	Surface Condition, #Ovality, #Straightness, End Finish, Bevel Angle, Root Face,#Outer Dia. & Thickness, Length, Marking	Measurement & visual	# after spider fixing
4.0	Document review & Issuance of IRN	Review of final dossier (*) & Inspection Report	Review	(*) along with Index

NOTE

A). STATUTORY REQUIREMENTS WILL BE COMPLIED BY THE CONTRACTOR.
B). ALL MATERIAL SHALL BE AS PER APPROVED DRAWINGS / DATA SHEET.
C). TATA POWER / ITS REP IDENTIFICATION STAMP ON MATERIALS WILL BE PRESERVED, IF REQD, SAME SHALL BE TRANSFERRED BY TATA POWER / ITS REP ONLY.
D). FINAL INSPECTION OF THE MAJOR ACTIVITIES ARE WITNESSED BY CLIENT AND IT IS HOLD POINT (AT THE DISCRETION TATA POWER)
E). MANUFACTURER SHALL PREPARE AND SUBMIT COMPLETE MANUFACTURING QUALITY PLAN IN PRESCRIBED FORMAT OR THEIR REGULAR FORMAT INDICATING THEIR REGULAR PRACTICES, TAKING CARE OF MINIMUM REQUIREMENT AS INDICATED ABOVE.
F). INSPECTION OF SPARES SHALL BE MANUFACTURED & INSPECTED AS PER APPLICABLE CLAUSES OF THIS QUALITY PLAN .SPARES OFFERED FOR INSPECTION SHALL BE PREFFERED ALONG WITH MAIN ITEMS (IF ORDERD).
G). AS PER SEPCIFICATION PROPER PAINTING & PACKING SHALL BE ENSURED BY VENDOR BEFORE SHIPMENT TO AVOID ANY TRANSIT DAMAGE.

Meant for (Internal Circulation / External – Stakeholders Circulation)

		20.02.15	20/2/15	20/2/15
R0	ISSUE FOR USE	PG	PU	SS
Rev. No	Reason for Revision	Prepared By & Date	Checked By & Date	Approved By & Date

TATA POWER	The Tata Power Company Limited Corporate Engineering-Quality Assurance Inspection & Testing	TATA
TPQAIT-QAXX-00-MX-SQP-046	STANDARD QUALITY PLAN FOR DELUGE VALVE	Date of Issue:

Sr. No	COMPONENT / OPERATION	CHARACTERISTICS CHECKED	TYPE / METHOD OF CHECK	REMARKS
1	2	3	4	5
1.0	**MATERIAL:**	(All Materials shall be as per approved drawings / Data sheet)		
1.1	Body, Cover Casting	Chemical & Physical properties.	Review of MTC	
1.2	Clapper / Clamp / Ring Casting	Chemical & Physical properties.	Review of MTC	
1.3	Diaphragm & Rubber Seat	Polymer & Mechanical Test	Review of MTC	COC for Disc Seal
1.4	Drive Shaft & Stub Shaft	Chemical & Mechanical properties NDT	Review of MTC	100 % UT,if Shaft Dia >=40 mm
2.0	**INPROCESS INSPECTION: (Generally in line with manufacturer standard)**			
3.0	**Final Inspection : (Customer HOLD Point)**			
3.1	Body & Seat	Hydro Test	Testing and Measurement	
3.2	Performance Test	Test as per UL - 260 (all lists)	Testing and Measurement	
3.3	Complete Assembly	Major Dimensions	Visual & Measurement	
4.0	Document review & Issuance of IRN	Review of final dossier (*) & Inspection Report	Review	(*) along with Index

NOTE

i). Deluge valve should be preferably from UL/ FM/ FOC approved source.
A). STATUTORY REQUIREMENTS WILL BE COMPLIED BY THE CONTRACTOR.
B). ALL MATERIAL SHALL BE AS PER APPROVED DRAWINGS / DATA SHEET.
C). TATA POWER / ITS REP IDENTIFICATION STAMP ON MATERIALS WILL BE PRESERVED, IF REQD, SAME SHALL BE TRANSFERRED BY TATA POWER / ITS REP ONLY.
D). FINAL INSPECTION OF THE MAJOR ACTIVITIES ARE WITNESSED BY CLIENT AND IT IS HOLD POINT (AT THE DISCRETION TATA POWER)
E). MANUFACTURER SHALL PREPARE AND SUBMIT COMPLETE MANUFACTURING QUALITY PLAN IN PRESCRIBED FORMAT OR THEIR REGULAR FORMAT INDICATING THEIR REGULAR PRACTICES, TAKING CARE OF MINIMUM REQUIREMENT AS INDICATED ABOVE.
F). INSPECTION OF SPARES SHALL BE MANUFACTURED & INSPECTED AS PER APPLICABLE CLAUSES OF THIS QUALITY PLAN .SPARES OFFERED FOR INSPECTION SHALL BE PREFFERED ALONG WITH MAIN ITEMS (IF ORDERD).
G). AS PER SEPCIFICATION PROPER PAINTING & PACKING SHALL BE ENSURED BY VENDOR BEFORE SHIPMENT TO AVOID ANY TRANSIT DAMAGE.

Meant for (Internal Circulation / External – Stakeholders Circulation)

		20.02.15	20/2/15	20/02/15
R0	ISSUE FOR USE	PG	PU	SS
Rev. No	Reason for Revision	Prepared By & Date	Checked By & Date	Approved By & Date

TATA POWER	The Tata Power Company Limited Corporate Engineering-Quality Assurance Inspection & Testing	TATA
TPQAIT-QAXX-00-MX-SQP-047	STANDARD QUALITY PLAN FOR FITTINGS (ROLLED & WELDED)/ MITRE BENDS	Date of Issue:

Sr. No	COMPONENT / OPERATION	CHARACTERISTICS CHECKED	TYPE / METHOD OF CHECK	REMARKS
1	2	3	4	5
1.0	**MATERIAL:**	(Generally in-line with manufacturer standard / technical specification)		
1.1	Plate/ Pipes	Chemical & Physical Properties	MTC Review	Also Hydro test Report for Pipes
2.0	**INPROCESS INSPECTION:** (Generally in-line with manufacturer standard)			
2.1	Welding	WPS,PQR,WPQ.	Qualification	By test/ Review of Doc
2.2	Weldment	DPT/ MPT - on Back gauge and final weld	NDT	
3.0	**FINAL INSPECTION & TESTS: (CUSTOMER HOLD POINTS)**			
3.1	Final Weldment	RT	NDT	10% for Butt joints *
3.2	Finish Product	Hydrostatic Test	No leakage	
		Surface Condition, End Finish, Bevel Angle, Outer Dia.,Ovality & Thickness	Measurement & Visual	
4.0	Document review & Issuance of IRN	Review of final dossier (*) & Inspection Report	Review	(*) along with Index

NOTE

i). FOR PLATE THICKNESS 19 mm AND ABOVE, PRE AND POST HEAT OF WELDMENTS SHALL BE DONE AND REPORT TO BE MAINTAINED FOR REVIEW.

Ii). * IN CASE OF GOLDEN JOINT HYDRO TEST IS NOT CARRIED OUT, 100% OF BUTT WELD SHALL BE RADIOGRAPHY TESTED. IN CASE OF UT INPLACE OF RT, SPECIFIC APPROVAL OF OWNER IS NEEDED (FOR 90% OF BUTT WELD). AS 10% RT IS MANDATORY.

A). STATUTORY REQUIREMENTS WILL BE COMPLIED BY THE CONTRACTOR.

B). ALL MATERIAL SHALL BE AS PER APPROVED DRAWINGS / DATA SHEET.

C). TATA POWER / ITS REP IDENTIFICATION STAMP ON MATERIALS WILL BE PRESERVED, IF REQD, SAME SHALL BE TRANSFERRED BY TATA POWER / ITS REP ONLY.

D). FINAL INSPECTION OF THE MAJOR ACTIVITIES ARE WITNESSED BY CLIENT AND IT IS HOLD POINT (AT THE DISCRETION TATA POWER)

E). MANUFACTURER SHALL PREPARE AND SUBMIT COMPLETE MANUFACTURING QUALITY PLAN IN PRESCRIBED FORMAT OR THEIR REGULAR FORMAT INDICATING THEIR REGULAR PRACTICES, TAKING CARE OF MINIMUM REQUIREMENT AS INDICATED ABOVE.

F). INSPECTION OF SPARES SHALL BE MANUFACTURED & INSPECTED AS PER APPLICABLE CLAUSES OF THIS QUALITY PLAN .SPARES OFFERED FOR INSPECTION SHALL BE PREFFERED ALONG WITH MAIN ITEMS (IF ORDERD).

G). AS PER SEPCIFICATION PROPER PAINTING & PACKING SHALL BE ENSURED BY VENDOR BEFORE SHIPMENT TO AVOID ANY TRANSIT DAMAGE.

Meant for (Internal Circulation / External – Stakeholders Circulation)

		20.02.15	20/2/15	20/02/15
R0	ISSUE FOR USE	PG	PU	SS
Rev. No	Reason for Revision	Prepared By & Date	Checked By & Date	Approved By & Date

TATA POWER	The Tata Power Company Limited Corporate Engineering-Quality Assurance Inspection & Testing	TATA
TPQAIT-QAXX-00-MX-SQP-048	STANDARD QULITY PLAN FOR FITTINGS (FORGED/ FORMED) - NON IBR	Date of Issue:

Sr. No	COMPONENT / OPERATION	CHARACTERISTICS CHECKED	TYPE / METHOD OF CHECK	REMARKS
1	2	3	4	5
1.0	MATERIAL:	(Generally in-line with manufacturer standard / technical specification)		
1.1	Raw Material Inspection	Chemical & Physical Properties	MTC Review	IGC Test for SS 316 (ASTM A 262, Practice -E)
2.0	**INPROCESS INSPECTION:** (Generally in-line with manufacturer standard), Heat Treatment (as applicable)			
3.0	**FINAL INSPECTION & TESTS: (CUSTOMER HOLD POINTS)**			
3.1	Final Product	Sampling for check testing including Hardness	Measurement	
		PMI (Positive Material Identification)	Measurement	at Random 10 %
		End Finish & type, ID/ OD & Thickness/ schedule, Product Marking, Colour coding	Measurement & Visual	Specifc thread type shall be check at random
4.0	Document review & Issuance of IRN	Review of final dossier (*) & Inspection Report	Review	(*) along with Index

NOTE

i). IN CASEI OF GALVANIZED FITTINGS, CHECK FOR GALVANIZEDAS PER IS 4736, SELECTING SAMPLES FROM FINISH PRODUCT.
A). STATUTORY REQUIREMENTS WILL BE COMPLIED BY THE CONTRACTOR.
B). ALL MATERIAL SHALL BE AS PER APPROVED DRAWINGS / DATA SHEET.
C). TATA POWER / ITS REP IDENTIFICATION STAMP ON MATERIALS WILL BE PRESERVED, IF REQD, SAME SHALL BE TRANSFERRED BY TATA POWER / ITS REP ONLY.
D). FINAL INSPECTION OF THE MAJOR ACTIVITIES ARE WITNESSED BY CLIENT AND IT IS HOLD POINT (AT THE DISCRETION TATA POWER)
E). MANUFACTURER SHALL PREPARE AND SUBMIT COMPLETE MANUFACTURING QUALITY PLAN IN PRESCRIBED FORMAT OR THEIR REGULAR FORMAT INDICATING THEIR REGULAR PRACTICES, TAKING CARE OF MINIMUM REQUIREMENT AS INDICATED ABOVE.
F). INSPECTION OF SPARES SHALL BE MANUFACTURED & INSPECTED AS PER APPLICABLE CLAUSES OF THIS QUALITY PLAN .SPARES OFFERED FOR INSPECTION SHALL BE PREFFERED ALONG WITH MAIN ITEMS (IF ORDERD).
G). AS PER SEPCIFICATION PROPER PAINTING & PACKING SHALL BE ENSURED BY VENDOR BEFORE SHIPMENT TO AVOID ANY TRANSIT DAMAGE.

Meant for (Internal Circulation / External – Stakeholders Circulation)

		Gokul PM 20.02.15	Pupalli 20/2/15	20/02/15
R0	ISSUE FOR USE	PG	PU	SS
Rev. No	Reason for Revision	Prepared By & Date	Checked By & Date	Approved By & Date

TATA POWER	The Tata Power Company Limited Corporate Engineering-Quality Assurance Inspection & Testing	TATA
TPQAIT-QAXX-00-MX-SQP-125	STANDARD QUALITY PLAN FOR FIRE HOSE WITH COUPLING (Rubber Lined & Unlined Flax Canvas type)	Date of Issue:

Sr. No	COMPONENT / OPERATION	CHARACTERISTICS CHECKED	TYPE / METHOD OF CHECK	REMARKS
1	2	3	4	5
1.0	MATERIAL:	(All Materials shall be as per approved drawings / Data sheet)		
1.1	Coupling & Nozzle	Chemical & Physical Properties	Review of MTC	No repair of casting/forging defects
1.2	Hose Pipe	Workmanship	Review of MTC	
2.0	INPROCESS INSPECTION: (Generally in line with manufacturer standard)			
3.0	Final Inspection : (Customer HOLD Point)			
3.1	Hose Pipe (Rubber lined)* as per IS 636	Internal dia and Coil Dia, Length & Mass	Measurment	*MTC Review, Random witness 01 no./ Lot
		Hydrotest Proof Test & Burst Test	Visual, Measurement	
		Kink Test	Visual at Hydrostatic Pressure	
		Change in Length & Change in Dia	Measurment	
		Accellearted Ageing Test	Physical Check	
		Adhesion Test	Physical Check	
		Abrasion resistance Test	Physical Check	
		Heat resistance Test	Physical Check	
3.2	Hose Pipe (Unlined Flax Canvas type)* as per IS 4927	Internal dia, Coil dia, Length, Mass, Chnage in Length & Change in Dia	Measurment	*MTC Review, Random witness 01 no./ Lot
		Hydrotest Proof Test & Burst Test	Visual, Measurement	
		Alkali Solubility of Flax	Measurment	
		Percolation Test	Measurment	
3.3	Coupling	Dimensional	Visual, Dimensional	
3.3	Coupling Assembly	Hydro Test	Visual, Measurement	
4.0	Document review & Issuance of IRN	Review of final dossier (*) & Inspection Report	Review	(*) along with Index

NOTE

A). STATUTORY REQUIREMENTS WILL BE COMPLIED BY THE CONTRACTOR.
B). ALL MATERIALS SHALL BE AS PER THE APPROVED DRAWINGS / DATA SHEET.
C) TATA POWER / ITS REP IDENTIFICATION STAMP ON MATERIALS WILL BE PRESERVED, IF REQD, SAME SHALL BE TRANSFERRED BY TATA POWER / ITS REP ONLY
D). FINAL INSPECTION OF THE MAJOR ACTIVITIES ARE WITTNESSED BY CLIENT AND IT IS HOLD POINT (AT THE DISCRETION TATA POWER)
E). MANUFACTURER SHALL PREPARE AND SUBMIT COMPLETE MANUFACTURING QUALITY PLAN IN PRESCRIBED FORMAT OR THEIR REGULAR FORMAT INDICATING THEIR REGULAR PRACTICES, TAKING CARE OF MINIMUM REQUIREMENT AS INDICATED ABOVE
F).INSPECTION OF THE MAINTAINCE SPARES SHALL BE OFFERED ALONG WITH THE MAIN SUPPLY AS PER THE INSPECTION STAGES OF 1 TO 5
G).PROPER PACKING BEFORE SHIPMENT TO BE ENSURED BY VENDOR

Meant for (Internal Circulation / External – Stakeholders Circulation)

		21.05.15	21.05.15	21/05/15
R0		PKG/PG	PU	SS
Rev.No	Reason for Revision	Prepared By & Date	Checked By & Date	Checked By & Date

Document Title
STANDARD QUALITY PLAN FOR LV (UPTO & INCLUDING 1.1 kV) POWER & CONTROL CABLES

		12/5/15	CRB 14/5/15	14/05/2015	RG 14/5/15
0	Initial Submission	RG	CRB (Head QAI- E)	SS Head (QA&I)	
Revision No.	Reason for revision	Prepared By & Date	Checked By & Date	Approved By & Date	Issued by & Date

Confidential & Proprietary – The Tata Power Company Ltd.

TATA POWER	The Tata Power Company Limited Corporate Engineering-Quality Assurance Inspection & Testing	TATA
TPQAIT-QAXX-00-EX-SQP-113 REV.0	STANDARD QUALITY PLAN FOR LV (UPTO & INCLUDING 1.1 kV) POWER & CONTROL CABLES	Date of Issue: 14/5/15

Sr. No.	COMPONENT / OPERATION		CHARACTERISTICS CHECKED	TYPE / METHOD OF CHECK	Remarks
1	2		3	4	7
1	**MATERIAL:**	(All material shall be as per approved drawing/ data sheet/ Specifications)			
	PVC FRLS Outer Sheath, Inner Sheath, Insulation Compound, Copper Conductor, Galvenized Steel Flat Strip/Round Wire.		Relevant Standards & Specifications	Review of co-related MTC.	Additional sample testing for insulation, conductor & sheath by cable manufacturer
2	**INPROCESS INSPECTION:** (Generally in line with manufacturer standard)				
3	**FINAL INSPECTION - CHP/ Witness by Tata Power.**				
3.1	**Routine Tests**	1	Conductor Resistance	Testing and Measurement	100% test by cable manufacturer & review by Tata Power
		2	High Voltage Test		
3.2	**Acceptance Tests**	1	<u>Dimensions:</u>	Testing and Measurementm as per relevant IS standard IS 1554 - Part 1 (for PVS Insulated Cables) / IS 7098 Part -1 (XLPE insulated Cables) on sample selected by Tata Power as per IS.	CHP
			Thickness of Insulation, Inner and Outer Sheath & colour code, Armour Size		
			Conductor Dia & Overall dia		
		2	Annealing test (for Copper)		
		3	Tensile Test (for Aluminium)		
		4	Wrapping Test (for Aluminium)		
		5	Tensile Strength and Elongation at Break for Insulation, Inner and Outer sheath		
		6	Insulation Resistance (Volume Resistivity) at Room Temperature and Elevated Temperature		
		7	Conductor Resistance		
		8	High Voltage Test		
		9	Hot Set Test (For XLPE Insulation)		
		10	Sheath Embossing/ Printing		
		11	Galvenizing Tests on armour		
		12	Rewinding of Drum to check for Length, Surface Defects, Finishing, Embossing, Printing etc. (Min.Two Drums from offered lot)		
		13	Anti Rodent and Anti Termite Test		
3.3	**FRLS Tests** (One Sample from offered lot) (If applicable as per contract technical specifications)	1	Oxygen Index	ASTM-D-2863/ NES-	
		2	Temperature Index	ASTM-D-2863	
		3	Smoke Density Rating	ASTM D-2843	
		4	Acid Gas Generation	IEC 60754-1	
		5	Flammability Test	IS 10810-53, 61 & 62 (Category-A)	
3.4	**Type tests**	1	Test for Armour (wire/ strip)	Table-5 (IS1554), Table (IS7098),IS 3965	Approved Type Test Report Review during final inspection.
		2	<u>Physical Tests on Insulation</u>		
		a	Ageing in Air Oven	IS 10810 - 11	
		b	Shrinkage Test	IS 10810 - 12	
		c	Water Absorption Test (Gravimetric) (For XLPE)	IS 10810 - 33	
		d	Hot deformation (For PVC)	IS 10810 - 15	
		e	Heat Shock test (For PVC)	IS 10810 - 14	
		f	Loss of Mass in air oven (For PVC)	IS 10810 - 10	
		g	Thermal Stability (For PVC)	IS 5831	

TATA POWER	The Tata Power Company Limited Corporate Engineering-Quality Assurance Inspection & Testing	TATA
TPQAIT-QAXX-00-EX-SQP-113 REV.0	STANDARD QUALITY PLAN FOR LV (UPTO & INCLUDING 1.1 kV) POWER & CONTROL CABLES	Date of Issue: 14/5/15

Sr. No.	COMPONENT / OPERATION		CHARACTERISTICS CHECKED	TYPE / METHOD OF CHECK	Remarks
1	2		3	4	7
3.4	Type tests	3	Physical Tests on Outer Sheath		Approved Type Test Report Review during final inspection.
		a	Ageing in Air Oven	IS 10810 - 11	
		b	Shrinkage Test	IS 10810 - 12	
		c	Hot deformation	IS 10810 - 15	
		d	Heat Shock test	IS 10810 - 14	
		e	Loss of Mass in air oven	IS 10810 - 10	
		f	Thermal Stability	IS 5831	
3.5	Optional Tests (If applicable as per contract technical specifications)	1	Resistance to Ultra Violet Radiation on outer sheath	The retention values of TS and ultimate elongation after the tests shall be minimum 60% of TS and ultimate elongation before test. (DIN 53387 or ASTM-G-154)	Test Certificates (not older than one year) from recognised testing laboratory to be furnished for review for similar design mix. In case test certificates are not available, test is to be conducted on randomly selected one sampleby Tata Power, in approved lab before acceptance of cable.
		2	Accelerated water absorption test on PVC Insulation	NEMA-WC-70	
		3	Water Absorption on outer sheath	IS-10810 Part 33, Type-B compound as per IS-5831	Water Absorption value shall not exceed 10 mg/sq.cm
4.0	Document review & Issuance of IRN		Review of Qaulity dossier (*) & Inspection report	Review	(*) along with index.

NOTE

A) STATUTORY REQUIREMENTS WILL BE COMPLIED BY THE CONTRACTOR.
B) ALL MATERIAL SHALL BE AS PER APPROVED DRAWINGS / DATA SHEET.
C) TATA POWER / ITS REP IDENTIFICATION STAMP ON MATERIALS WILL BE PRESERVED, IF REQD, SAME SHALL BE TRANSFERRED BY TATA POWER / ITS REP ONLY.
D) FINAL INSPECTION OF THE MAJOR ACTIVITIES ARE WITNESSED BY CLIENT AND IT IS HOLD POINT (AT THE DISCRETION TATA POWER)
E) MANUFACTURER SHALL PREPARE AND SUBMIT COMPLETE MANUFACTURING QUALITY PLAN IN PRESCRIBED FORMAT OR THEIR REGULAR FORMAT INDICATING THEIR REGULAR PRACTICES, TAKING CARE OF MINIMUM REQUIREMENT AS INDICATED ABOVE INCLUDING ADDITIONAL TESTING REQUIREMENTS AS PER CONTRACT SPECIFICATION.
F) INSPECTION OF SPARES SHALL BE MANUFACTURED & INSPECTED AS PER APPLICABLE CLAUSES OF THIS QUALITY PLAN. SPARES OFFERED FOR INSPECTION SHALL BE PREFFERED ALONG WITH MAIN ITEMS (IF ORDERD).
G) CALIBRATION CERTIFICATES OF THE EQUIPMENT USED FOR TESTING SHALL BE PROVIDED FOR REVIEW.
H) AS PER SEPCIFICATION PROPER PAINTING & PACKING SHALL BE ENSURED BY VENDOR BEFORE SHIPMENT TO AVOID ANY TRANSIT DAMAGE.
I) TATA POWER RESERVES THE RIGHT TO DEMAND / VERIFY/ AUDIT/ WITNESS ANY OF THE CHECK POINTS MENTIONED IN THE SCOPE OF SUPPLIER.

Confidential and Proprietary -- The Tata Power Company Limited.

TATA POWER	The Tata Power Company Limited **Corporate Engineering-Quality Assurance** **Inspection & Testing**	TATA
TPQAIT-QAXX-00-EX-SQP-105 REV.0	**STANDARD QUALITY PLAN FOR LOW VOLTAGE SWITCHGEAR PANELS.**	**Date of Issue:** **April 2015.**

Document Title

STANDARD QUALITY PLAN FOR INDOOR LOW VOLTAGE SWITCHGEARS.

(415VOLT DISTRIBUTION BOARDS including, MCC, PCC, MLDB,ELDB, UPS DB, BATTERY CHARGER DB (DCDB) & WELDING DB).

0	Initial Submission.	RP	CRB (Head QAI- E)	SGP Chief (QAIT)	
Revision No.	Reason for revision	Prepared By & Date	Checked By & Date	Approved By & Date	Issued by & Date

Confidential & Proprietary – The Tata Power Company Ltd.

TATA POWER	The Tata Power Company Limited Corporate Engineering-Quality Assurance Inspection & Testing.	TATA
TPQAIT-QAXX-00-EX-SQP-105 REV.0	STANDARD QUALITY PLAN FOR INDOOR LOW VOLTAGE SWITCHGEARS. (415VOLT DISTRIBUTION BOARDS including, MCC, PCC, MLDB,ELDB, UPS DB, BATTERY CHARGER DB (DCDB) & WELDING DB).	Date of Issue: April 2015.

Sr. No	COMPONENT / OPERATION		CHARACTERISTICS CHECKED	TYPE / METHOD OF CHECK	REMARKS
1	2		3	4	5
1.0	MATERIAL:	(Generally in-line with manufacturer standard / technical specification)			
1.1	Sheet Metal	1	Verification of raw material properties, dimension check, Mechanical, Electrical & Chemical Properties.	Test to be carried out by material / component supplier.	All items TCs to be reviewed by main supplier. (The TCs for CT, PT, Relay, interrupter, MFM are to be submitted to TATAPOWER as per requirement.)
1.2	Copper bus bar	2	Purity of copper, conductivity, hardness,		
1.3	ACB	1	Contact Resistance	Test to be carried out by material /component supplier as per IS-13118/ IEC 62271-100 & 200	
		2	HV & IR test Test		
		3	Mechanical endurance test		
		4	Electrical endurance tests		
1.4	CT	1	CT Ratio, Polarity, kpV, ISF, Accuracy (as applicable).	Test to be carried out by material / component supplier as per IS 2705/ IEC 60044	
		2	HV & IR test Test		
		3	Secondary Resistance		
		4	Interturn Insulation test with Voltage applied to appear in test report.		
1.5	PT	1	PT Ratio, Polarity,	Test to be carried out by material / component supplier as per IS 4146/ IEC 60044	
		2	Secondary Induced Voltage Test		
		3	HV Test & IR test		
		4	Primary and Secondary Resistance		
1.6	Multi Function Meter	1	Performance & Accuracy	Test to be carried out by material / component supplier	
		2	Dimension		
		3	Make Type Rating		
		4	2 kV HV test		
		5	IEC 61850 Compatibility		
1.7	Relay	1	Performance & Functional Checks	Test to be carried out by material / component supplier	
		2	Make, Type, Rating		
		3	2 kV HV test		
		4	IEC 61850 Compatibility		
1.8	Insulator	1	As per IS-731/5621, IEC 575, IEC 60233	Test to be carried out by material supplier	
2.0	INPROCESS INSPECTION: (Generally inline with manufacturing plan)				
1.0	Panel Fabrication	1	Dimensional Conformity, Bend Angle, Profile, Deburring & welding finish, slag removal.		
		2	Surface preparation		
		3	Surface Finish, Paint Shade, Finishing, Coating thickness.		

TATA POWER	The Tata Power Company Limited Corporate Engineering-Quality Assurance Inspection & Testing.	TATA
TPQAIT-QAXX-00-EX-SQP-105 REV.0	STANDARD QUALITY PLAN FOR INDOOR LOW VOLTAGE SWITCHGEARS. (415VOLT DISTRIBUTION BOARDS including, MCC, PCC, MLDB,ELDB, UPS DB, BATTERY CHARGER DB (DCDB) & WELDING DB).	Date of Issue: April 2015.

Sr. No	COMPONENT / OPERATION		CHARACTERISTICS CHECKED	TYPE / METHOD OF CHECK	REMARKS
1	2		3	4	5
2.0	Panel Assembly test	1	Functional tests,	Test to be carried out by material / component supplier	Verification of Records by TATA POWER.
		2	Scheme checks		
		3	Clearance checks		
		4	HV & IR on power and control circuit.		
		5	Conformance to the GA drawing.		
		6	Tinning/ silver coating verification of bus bar joint		
		7	Contact Resistance of bus bar joint		
		8	Measurement of tightness of bus bar joints by torque wrench.		
3.0	FINAL INSPECTION:(As per approved GA, data sheet, wiring diagram, QAP&IEC 62271-100 &200/ IEC 60694)				
3.1	Routine tests	1	Visual & dimensional Check including layout, tag plates, paint shade, paint thickness, bus markings and sleeving, Joint shrouding of bus bar, clearance checks, creepage distance checks, maintenance accessibility, door alignment, IP class, lifting arrangement, earthing point, surface finish, Caution Labels etc.	Testing & Measurement as per IEC 60694/IEC 62271-100 &200	CHP
		2	Bill of material checks (Make, rating, Name plate etc.)		
		3	Interchangeability of identical modules / Feeders and rack-in and out operation.		
		4	Verification of bus bar support arrangements with respect to type tested panel drawings, provision of external cable termination and bus duct as applicable.		
		5	Wiring checks for control and auxiliary equipments circuits and aux. contacts		
		6	Measurement of tightness of bus bar joints by torque wrench.		
		7	Relay operation checks thru secondary injection (If applicable)		
		8	Insulation Resistance of main, aux. and control circuits before and after HV test		
		9	Functional checks for Panel indications, annunciations, any analog monitoring devices such as Ammeter, Voltmeter, Energy meter, Limit Switches, Spring Charging Motor, Interlocks of shutter assembly, Interlocks of Safety Barriers.		
		10	HV test on power and control circuit.		
		11	Communications checks between relays & HMI, HMI functional checks.		
		12	Measurement of insulation resistance of Circuit Breaker in closed, open position.		
		13	Measurement of milli-volt drop across Circuit Breaker main contacts, other joints and also across bus bar joint.		
		14	Measurement of resistance, IR value and drop-off/pick-up voltage of close and trip coils		

TATA POWER	The Tata Power Company Limited Corporate Engineering-Quality Assurance Inspection & Testing.	TATA
TPQAIT-QAXX-00-EX-SQP-105 REV.0	STANDARD QUALITY PLAN FOR INDOOR LOW VOLTAGE SWITCHGEARS. (415VOLT DISTRIBUTION BOARDS including, MCC, PCC, MLDB,ELDB, UPS DB, BATTERY CHARGER DB (DCDB) & WELDING DB).	Date of Issue: April 2015.

Sr. No	COMPONENT / OPERATION		CHARACTERISTICS CHECKED	TYPE / METHOD OF CHECK	REMARKS
1	2		3	4	5
	Routine tests	15	Measurement of CT/PT polarity, ratio, secondary resistance and knee point voltage from terminal block.	Testing & Measurement as per IEC 60694/IEC 62271-100 &200	CHP
		16	Secondary injection of all metering circuits.		
3.2	Type Tests	1	Short circuit making and breaking tests of breakers.	Testing & Measurement as per IEC 62271-200/ IEC 60694 standard)	Valid TYPE tests certificate not older than 5 year is prerequisite.
		2	Rated Short Time current withstand & peak withstand test.		
		3	Temperature Rise Test on bus bar and component contained in the metal enclosed switchgear.		
		4	Degree of protection of panels.		
		5	Electromagnetic compatibility (EMC).		
		6	Any other special / type test as per technical specifications.		
	Any Separate Type/ Design validation tests shall be carried out in accordance with TATA POWER specification/ PO or as per mutually agreed in MQP.				
4.0	Document review & issuance of IRN				
4.1	PACKING & PRE-SHIPMENT.	1	Visual Verification.	Measurement & Visual by Main supplier	
		2	Quantity Verification & Packing in cartons		
		3	One hard copy of the as built drawing along with shipping		
		4	Identification.		
4.2	DISPATCH.		Issue of Release note / MDCC.	Customer Hold Point.	

NOTE

A) ALL MATERIAL SHALL BE AS PER APPROVED DRAWING/ DATA SHEET.
B) STATUTORY REQUIREMENTS WILL BE COMPLIED BY THE CONTRACTOR.
C) TATA POWER / ITS REP IDENTIFICATION STAMP ON MATERIALS WILL BE PRESERVED, IF REQD, SAME SHALL BE TRANSFERRED BY TATA POWER / ITS REP ONLY FOR MATERIAL TRACEBILITY.
D) FINAL INSPECTION OF THE MAJOR ACTIVITIES ARE WITTNESSED BY CLIENT AND IT IS HOLD POINT (AT THE DISCRETION TATA POWER)
E) MANUFACTURER SHALL PREPARE AND SUBMIT COMPLETE MANUFACTURING QUALITY PLAN IN PRESCRIBED FORMAT OR THEIR REGULAR FORMAT INDICATING THEIR REGULAR PRACTICES, TAKING CARE OF MINIMUM REQUIREMENT AS INDICATED ABOVE.
F)INSPECTION OF THE MAINTAINCE SPARES SHALL BE OFFERED ALONG WITH THE MAIN SUPPLY AS PER THE INSPECTION STAGES OF 1 TO 4.
G)CALIBRATION CERTIFICATES OF THE EQUIPMENT USED FOR TESTING SHALL BE PROVIDED FOR REVIEW.
H)TATA POWER RESERVES THE RIGHT TO DEMAND / VERIFY/ AUDIT/ WITNESS ANY OF THE CHECK POINTS MENTIONED IN THE SCOPE OF SUPPLIER.
I) AS PER SPECIFICATION PROPER PAINTING & PACKING SHALL BE ENSURED BY VENDOR BEFORE SHIPMENT TO AVOID ANY TRANSIT DAMAGE.

TATA POWER	The Tata Power Company Limited Corporate Engineering-Quality Assurance Inspection & Testing	TATA
TPQAIT-QAXX-00-MX-SQP- 98	STANDARD QUALITY PLAN FOR Y TYPE STRAINER FOR WATER APPLICATION	Date of Issue: 24.03.15

Sr. No	COMPONENT / OPERATION	CHARACTERISTICS CHECKED	TYPE / METHOD OF CHECK	REMARKS
1	2	3	4	5
1.0	MATERIAL:	(Generally as per technical specification / approved datasheet)		
1.1	Body, Bonnet, Screen/Wire mesh	Chemical & Physical Properties & Mesh Size	MTC Review	only chemical if casted. DP on weld if fabricated & MTC of mother tube pipe.
2.0	INPROCESS INSPECTION: (Generally in-line with manufacturer standard)			
3.0	FINAL INSPECTION & TESTS: (CUSTOMER HOLD POINTS)			
3.1	Check for completeness as per the Drawing & BOM	Major dimension check with Mesh Size check	Measurement & visuel	
3.2	Pressure testing (excluding filter element)	Leak test	Measurement & visual	
3.3	Pressure drop test#	Across filter in 50% clogging & clean condition	Report Review	#Type Test
4.0	Document review & Issuance of IRN	Review of quality dossier (*) & Inspection report	Review	(*) along with Index

NOTE

A). STATUTORY REQUIREMENTS WILL BE COMPLIED BY THE CONTRACTOR.
B). ALL MATERIAL SHALL BE AS PER APPROVED DRAWINGS / DATA SHEET.
C). TATA POWER / ITS REP IDENTIFICATION STAMP ON MATERIALS WILL BE PRESERVED, IF REQD, SAME SHALL BE TRANSFERRED BY TATA POWER / ITS REP ONLY.
D). FINAL INSPECTION OF THE MAJOR ACTIVITIES ARE WITNESSED BY CLIENT AND IT IS HOLD POINT (AT THE DISCRETION TATA POWER)
E). MANUFACTURER SHALL PREPARE AND SUBMIT COMPLETE MANUFACTURING QUALITY PLAN IN PRESCRIBED FORMAT OR THEIR REGULAR FORMAT INDICATING THEIR REGULAR PRACTICES, TAKING CARE OF MINIMUM REQUIREMENT AS INDICATED ABOVE.
F). INSPECTION OF SPARES SHALL BE MANUFACTURED & INSPECTED AS PER APPLICABLE CLAUSES OF THIS QUALITY PLAN. SPARES OFFERED FOR INSPECTION SHALL BE PREFFERED ALONG WITH MAIN ITEMS (IF ORDERD).
G). AS PER SEPCIFICATION PROPER PAINTING & PACKING SHALL BE ENSURED BY VENDOR BEFORE SHIPMENT TO AVOID ANY TRANSIT DAMAGE.

Meant for (Internal Circulation / External – Stakeholders Circulation)

Rev. No	Reason for Revision	Prepared By & Date	Checked By & Date	Approved By & Date
		DP 23/3/15	PU 24/3/15	SS 24/03/15
R0	First issue			

Attachment 1

TATA POWER	The Tata Power Company Limited Corporate Engineering-Quality Assurance Inspection & Testing	TATA
TPQAIT-QAXX-00-MX-SQP-34	STANDARD QAP FOR HORIZONTAL PUMP	Date of Issue:

Sr. No	COMPONENT/ OPERATION	CHARACTERISTICS CHECKED	TYPE / METHOD OF CHECK	REMARKS
1	2	3	4	5
1.0	**MATERIAL:** (Generally in-line with manufacturer standard/ technical specification)			
1.1	Castings	Chemical & Physical properties	Review of MTC	* Manufacturer to specify if any NDT is carried out as inward inspection of raw material.
		Visual & Dimensional	Visual and Measurement	
		Hardness	Measurement	
		NDT as applicable*	Review	
1.2	Forgings	Chemical & Physical properties	Review of MTC	
		Visual & Dimensional	Visual and Measurement	
		Hardness	Measurement	
		NDT	Ultrasonic Test	UT, if Dia >= 40mm
2.0	**INPROCESS INSPECTION:** (Generally in line with manufacturer standard)			
2.1	Casing	Visual, Dimensional	Visual, Measurement	
		Surface defects	DPT	
		Hydro Test	Review	
2.2	Shaft & Shaft sleeve	Dimensional, Run out	Measurement	
		Surface defects	DPT	
2.3	Impeller	Visual, Dimensional	Visual, Measurement	
		Surface defects	DPT	
		Dynamic balancing	Measurement	Gr 6.3 or better
3.0	**Final Inspection: (Customer HOLD Point)**			
3.1	Pump assembly	Overall dimensions & Proper assembly	Visual, Measurement	
		Vibration, Noise level		
		Performance test as per HIS	Measurement*	* Acceptance norms as per HIS & Approved data sheet
3.2		Strip test	One of each type	Randomly selected
3.3		NPSH, if required	One of each type	Randomly selected
4.0	Document review & issuance of IRN	Review of quality dossier (*) & inspection report	Review	(*) along with index

NOTE

A). STATUTORY REQUIREMENTS WILL BE COMPLIED BY THE CONTRACTOR.
B). ALL MATERIAL SHALL BE AS PER APPROVED DRAWINGS / DATA SHEET.
C). TATA POWER / ITS REP IDENTIFICATION STAMP ON MATERIALS WILL BE PRESERVED, IF REQD, SAME SHALL BE TRANSFERRED BY TATA POWER / ITS REP ONLY.
D). FINAL INSPECTION OF THE MAJOR ACTIVITIES ARE WITNESSED BY CLIENT AND IT IS HOLD POINT (AT THE DISCRETION TATA POWER)
E). MANUFACTURER SHALL PREPARE AND SUBMIT COMPLETE MANUFACTURING QUALITY PLAN IN PRESCRIBED FORMAT OR THEIR REGULAR FORMAT INDICATING THEIR REGULAR PRACTICES, TAKING CARE OF MINIMUM REQUIREMENT AS INDICATED ABOVE.
F). INSPECTION OF SPARES SHALL BE MANUFACTURED & INSPECTED AS PER APPLICABLE CLAUSES OF THIS QUALITY PLAN. SPARES OFFERED FOR INSPECTION SHALL BE PREFFERED ALONG WITH MAIN ITEMS (IF ORDERD).
G). AS PER SEPCIFICATION PROPER PAINTING & PACKING SHALL BE ENSURED BY VENDOR BEFORE SHIPMENT TO AVOID ANY TRANSIT DAMAGE.

Meant for (Internal Circulation / External – Stakeholders Circulation)

Rev.No	Reason for Revision	Prepared By & Date	Checked By & Date	Approved By & Date
R0	First issue	DP	PU	SS 19/02/15

TATA POWER	The Tata Power Company Limited Corporate Engineering-Quality Assurance Inspection & Testing	TATA
TPQAIT-QAXX-00-MX-SQP- 118	STANDARD QUALITY PLAN FOR DIESEL ENGINE	Date of Issue:

Sr. No	COMPONENT / OPERATION	CHARACTERISTICS CHECKED	TYPE / METHOD OF CHECK	REMARKS
1	2	3	4	5
1.0	MATERIAL:	(All Materials shall be as per approved drawings / Data sheet)		
1.1	Gear(Crank shaft & Camshaft),Connecting rod, Cylinder Block, Cylinder Head, Cylinder Liner,Piston,	Chemical & Physical properties	Review of MTC	
1.2	Crank shaft	Ultrasonic Test	Review of MTC	100 % UT,if Dia >40 mm
1.3	Gear (Crank shaft & Camshaft), Connecting Rod	MPI	Review of MTC	
1.4	Cylinder Block, Cylinder Head, Cylinder Liner	Pressure Test	Review of MTC	
2.0	INPROCESS INSPECTION: (Generally in line with manufacturer standard)			
2.1	Crank shaft	Dyanamic Balancing	Visual, Measurement	
2.2	Fuel Pump & Lub Pump	Functional/ Performance	Review	Also Calibration for Fuel Pump
2.3	Radiator	Pessure Test	Review	
3.0	Final Inspection : (Customer HOLD Point)			
3.1	Engine Testing (Performance Test)	No load test Load test - (25%, 50%, 75%, 110% of load for min. 15minutes) and 100% for min. 01 hr.	Testing and Measurement	Engine shall be tested by manufacturer as per ISO 3046 before offering to owner (Tata Power).
		Fuel Oil test - Specific fuel consumption & Lube oil -- Oil temperature .	Testing and Measurement	
		Noise Level	Measurement	
		Vibration check	Measurement	
3.2	Surface preparation & Painting	As per Techanical Specification	Visual & DFT Measurement	
4.0	Document review	Review of final dossier	Docs verification	
5.0	Issuance of IRN	Inspection Release note	IRN	

NOTE

A) STATUTORY REQUIREMENTS WILL BE COMPLIED BY THE CONTRACTOR
B) ALL MATERIALS SHALL BE AS PER THE APPROVED DRAWINGS / DATA SHEET
C) TATA POWER / ITS REP IDENTIFICATION STAMP ON MATERIALS WILL BE PRESERVED. IF REQD, SAME SHALL BE TRANSFERRED BY TATA POWER / ITS REP ONLY
D) FINAL INSPECTION OF THE MAJOR ACTIVITIES ARE WITTNESSED BY CLIENT AND IT IS HOLD POINT (AT THE DISCRETION TATA POWER)
E) MANUFACTURER SHALL PREPARE AND SUBMIT COMPLETE MANUFACTURING QUALITY PLAN IN PRESCRIBED FORMAT OR THEIR REGULAR FORMAT INDICATING THEIR REGULAR PRACTICES, TAKING CARE OF MINIMUM REQUIREMENT AS INDICATED ABOVE
F) INSPECTION OF THE MAINTAINCE SPARES SHALL BE OFFERED ALONG WITH THE MAIN SUPPLY AS PER THE INSPECTION STAGES OF 1 TO 5
G) PROPER PACKING BEFORE SHIPMENT TO BE ENSURED BY VENDOR

* Meant for (Internal Circulation / External – Stakeholders Circulation)

		18/05/2015	18-05-15	18/05/15
R0		PG	PU	SS
Rev.No	Reason for Revision	Prepared By & Date	Checked By & Date	Approved By & Date

TATA POWER	The Tata Power Company Limited Corporate Engineering-Quality Assurance Inspection & Testing	TATA
TPQAIT-QAXX-00-MX-SQP-255	STANDARD QUALITY PLAN FOR SAFETY RELIEF VALVE- SPRING LOADED (NON -IBR)	Date of Issue: 15-02-2017

Sr. No	COMPONENT / OPERATION	CHARACTERISTICS CHECKED	TYPE / METHOD OF CHECK	REMARKS
1	2	3	4	5
1.0	MATERIAL:	(Generally in-line with manufacturer standard / technical specification)		
1.1	Body, Bonnet, Stem, Spring	Chemical & Physical Properties	MTC Review	
1.2	Body & Bonnet	MT & PT	MTC Review	
1.3	Nozzle (Forging)	Chemical & Physical Properties	MTC Review	
		MT or PT	MTC Review	
1.4	Spring	Load test , Hardness & MT	MTC Review	
2.0	INPROCESS INSPECTION: (Generally in-line with manufacturer standard)			
2.1	Machining of parts	Surface finish and Major dimension	Report	
		NDT-MPT/PT	NDT Report	
2.2	Spring test	Scragging /compression test	Report	
3.0	FINAL INSPECTION & TESTS: (CUSTOMER HOLD POINTS)			
3.1	Complete Valve Assembly as per the drawings	Check for completeness , Workmanship & Major Dimensions.	Visual & Measurement	
3.2	Hydro test	Body and Seat leak test	Report	
3.3	Performace test	Set pressure test	Report	
4.0	Document review & Issuance of IRN	Review of Qaulity dossier (*) & Inspection report	Review	(*) along with index.

NOTE

A). STATUTORY REQUIREMENTS WILL BE COMPLIED BY THE CONTRACTOR.
B). ALL MATERIAL SHALL BE AS PER APPROVED DRAWINGS / DATA SHEET.
C). TATA POWER / ITS REP IDENTIFICATION STAMP ON MATERIALS WILL BE PRESERVED, IF REQD, SAME SHALL BE TRANSFERRED BY TATA POWER / ITS REP ONLY.
D). FINAL INSPECTION OF THE MAJOR ACTIVITIES ARE WITNESSED BY CLIENT AND IT IS HOLD POINT (AT THE DISCRETION TATA POWER)
E). MANUFACTURER SHALL PREPARE AND SUBMIT COMPLETE MANUFACTURING QUALITY PLAN IN PRESCRIBED FORMAT OR THEIR REGULAR FORMAT INDICATING THEIR REGULAR PRACTICES, TAKING CARE OF MINIMUM REQUIREMENT AS INDICATED ABOVE.
F). INSPECTION OF SPARES SHALL BE MANUFACTURED & INSPECTED AS PER APPLICABLE CLAUSES OF THIS QUALITY PLAN .SPARES OFFERED FOR INSPECTION SHALL BE PREFFERED ALONG WITH MAIN ITEMS (IF ORDERD).
G).AS PER SEPCIFICATION PROPER PAINTING & PACKING SHALL BE ENSURED BY VENDOR BEFORE SHIPMENT TO AVOID ANY TRANSIT DAMAGE

Meant for (Internal Circulation / External – Stakeholders Circulation)

		15/02/17	15/02/17	15/02/17
R0		PU/PKG	PU/RGM	SS
Rev. No	Reason for Revision	Prepared By & Date	Checked By & Date	Approved By & Date

Section B

Technical Requirement of Fire Protection and Detection System

Chapter No 14

Quality Assurance Requirement.

THE TATA POWER COMPANY LIMITED

STANDARD TECHNICAL SPECIFICATION FOR

GENERAL REQUIREMENTS OF QUALITY ASSURANCE & INSPECTION

(Document No. – ENGG/QA/STD-SPEC/45)

WorkflowCompleted Printed By: AMAN GUPTA - 31/Jul/2025 - C

TATA

Tata Power

Engineering (Generation)

Revision	Date	Description	Prepared by	Checked by	Approved by
R05	10/05/2024	Revision	DP/RS	BVRM	CPT
R04	03/09/2021	Revision	DP/RP	SR/RS	CRB/CPT
R03	20/07/2020	Revision	SR	RP	CRB
R02	10/05/2017	Revision	DP /RP/RG/PU	SKJ/ RM/CRB	SS
R01	21/07/2016	Revision	SKJ / DP	RG	SS
R00	21/04/2015	First Issue	RG / SKJ / PU	SS	SS

Table of Contents

1.0 PURPOSE 3
2.0 SCOPE 3
3.0 DEFINITION 3
4.0 QUALITY ASSURANCE PROGRAMME 5
5.0 SUPPLIER QUALITY MANAGEMENT SYSTEM (QMS) 6
6.0 INSPECTION CATEGORIZATION PLAN, WELDING & NDT REQUIREMENT 9
7.0 INSPECTION AT SHOP 11
8.0 QUALITY DOSSIER (FOR SUPPLY PORTION) [PACKAGE WISE] 13
9.0 FQC DURING CONSTRUCTION AND PRE-COMMISSIONING. 14
10.0 ATTACHMENT 16

1.0 PURPOSE

Purpose of these requirements is to provide uniform general requirements for implementation of Quality Management System for projects being executed by OWNER.

2.0 SCOPE

2.1 Scope of these requirement covers pre-requisites of the Bidder's/ Supplier's/ Contractor's Quality Management System (QMS) applicable for all phases of contract execution including design, procurement, manufacture, factory testing, erection, field testing and commissioning, applicable other services and further to establish specific factors for which control shall be carried and put into continuing operation by the Bidder/ Supplier /Contractor to ensure that all supplies and services comply with the contract requirements.

2.2 The required/ specified reliability & other characteristics of quality should initially be "designed in" and then "built in". It is emphasized that, satisfactory product and system performance can be achieved only through strict control of all design, manufacturing, and erection/ installation processes as well as test and inspection.

2.3 During bid stage itself, BIDDER shall submit requisite documents to demonstrate that as a supplier/ contractor they have well defined and implemented QMS. They shall also establish that their QMS is taking care of their sub-supplier/agencies, and continually improve its effectiveness in accordance with the requirements of their QMS as per ISO 9001, or any other quality standard.

BIDDER shall submit a project specific organization chart defining the permanent positions responsible for QMS accompanied by a brief description of each position's function and responsibility.

3.0 DEFINITION

- **OWNER**
  Tata Power or its subsidiaries/ JV partners.

- **BIDDER**
  An organization/ agency, who propose to submit their offer against RFQ/enquiry floated by OWNER. Only successful bidder will be converted to supplier/ contractor on award of contract by OWNER.

- **Supplier / Contractor**
  An organization referred as Supplier/ contractor, who execute the contract awarded by Contracts department of OWNER. It also covers the Agency involved in execution of site/ field activities or provides services (as a contractor) when awarded by Contracts department of OWNER. A Supplier can also be a manufacturer for part of supply for his in-house products.

- **Sub-Supplier/ Sub-vendor**
  An organization, who manufactures, supplies the system or equipment or item and provides services to the supplier. It also covers manufacturer who manufactures and supplies the equipment or its components or items to the sub-suppliers to complete the system supply. It should also cover the agencies which also support execution of main supplier by providing qualified manpower/ services.

- **Third Party Inspection Agency (TPIA)**
  Any third-party organization or neutral agency mutually agreed, deputed for conducting inspection or quality surveillance activities on case-to-case basis.

- **Inspection Agency (IA)**
  An organization or any agency deputed by OWNER for conducting inspection or quality surveillance activities on behalf of OWNER on case-to-case basis.

- **Inspection Categorization Plan (ICP)**
  This document shall categorize the Quality Plan and Inspection scope of all equipment/ items in the package. This will also include the schedule for submission and approval of all Quality related documents.

- **Standard Quality Plan (SQP)/ Standard Field Quality Plan (SFP)**
  SQP shall comprise of minimum basic requirements of all tests/ checks to be carried out during manufacturing to meet/ conform technical requirement. SQP may be in the form of Inspection & Test Plan (ITP)/ Technical Specification as part of Bid Document.
  Similarly, SFP shall comprise of minimum basic requirements of all field tests/checks to be carried out during execution of the project.

- **Manufacturing Quality Plan (MQP)**
  MQP shall comprise of all tests/ checks indicated in standard Quality Plan (SQP) and tech specifications. It shall also include any additional quality checks/ tests required as per discussions (pre & post bid) to be followed during manufacturing of item/ equipment.

- **Field Quality Plan (FQP)**
  FQP shall detail out the activities and steps to be performed at project site and shall be followed from receipt of material to pre-commissioning stage. Shall include all tests / checks in Standard Field Quality Plan (SFP) & technical specification. FQP shall be prepared by contractor and to be submitted to OWNER at post award stage of contract for OWNER's approval.

- **Hold Point/ Customer hold point (CHP)**
  A check point for an activity mentioned in approved MQP/ FQP, which requires inspection/ verification, and acceptance by the OWNER or its representative for this stage before any further work is permitted.
  Supplier shall not process beyond a CHP without written acceptance & clearance of that activity by OWNER in writing.

- **Witness Point**
  A check point for an activity mentioned in the approved MQP/ FQP, which will be witnessed by OWNER or its representative.

Supplier will obtain consent from OWNER to proceed for further work, in case OWNER or its representative is not able to attend the activity within notification period.

- **Review / Verification Point**
  A check point for an activity mentioned in the approved MQP/ FQP that requires review of document/ test record by OWNER or its representative performed by the Supplier for acceptance.

- **Test Report Record**
  Such reports / records are document prepared by Supplier/ Sub-Supplier for test/ check conducted indicating details / types of tests including test results, relevant codes etc.

- **Inspection Report (IRT)**
  Such report which covers details of all the checks / activities carried out as per approved MQP. It also covers details of the observations and NCRs during those checks / inspection.

- **Inspection Release Note (IRN)**
  IRN is a document issued on standard format after successful quality checks/inspection and confirming to compliances of all observations and NCs if any.

- **Non-Conformity Report (NCR)/ Quality Correction Action Report (QCAR)**
  It is a report on deviation/ non-compliance with respect to the requirements laid down in the PO/ Technical Specification, MQP, Codes & standards. NCR shall be applicable during inspection at Shop as well during site Audits and QCAR shall be applicable for site inspection / surveillance.

4.0 QUALITY ASSURANCE PROGRAMME

To ensure that the equipment and services under the scope of contract whether manufactured or performed within the Bidder/ Supplier /Contractor's works or at his sub-vendor's premises or at site or at any other place of work are in accordance with the specifications, Bidder/ Supplier/ Contractor shall adopt suitable project specific QMS based on his organization's Quality Management System, regular practice, statutory requirements etc. as specified for the contract and submit the same for approval of OWNER, to control such activities at all points, as necessary. Such program shall be outlined by the Bidder/ Supplier/ contractor. Any deviation with respect to all above requirements (as specified in SQP, SFP, Technical specification as minimum quality requirements) shall be brought out clearly in the pre-bid stage by bidder.

4.1 OWNER Quality Document Approval Process & Inspection Process

OWNER uses Wrench software as an online platform for Engineering and Quality documents approval. Further, raising inspection call for STAGE / FINAL inspection for Category A items, Document review and material clearance for Cat B & Cat C items shall also be processed through Wrench. Access for Wrench system and necessary user training will be imparted to the authorized personnel of the supplier post award of contract.

5.0 SUPPLIER QUALITY MANAGEMENT SYSTEM (QMS)

5.1 All materials, components and equipment covered under the contract including bought out items shall be procured, manufactured, and tested at all the stages as per a comprehensive Quality Assurance Program. It is the Bidder/ Supplier / Contractor's responsibility to draw up and implement such program duly approved by the OWNER.

5.2 All items/equipment in the scope of the contract shall be classified into categories according to the criticality or other attributes of items/ equipment. A detailed proposal addressing vendor approvals and quality control of all such items/ equipment shall be proposed to OWNER for approval.

5.3 The detailed quality plans for shop manufactured items and for field activities including civil works (if applicable) shall be drawn up by the Bidder/ Supplier / Contractor separately as per the requirement of the specification, standards mentioned therein, quality practices and procedures followed by Supplier's/ his sub vendor's quality control department. MQP shall be prepared by manufacturer and submitted through supplier post award stage of contract for OWNER's approval. OWNER approved MQP to be referred during manufacturing & shop inspection. Typical format of Manufacturing Quality Plan is enclosed as Exhibit A.

5.4 Field quality plans shall detail out for all equipment, the quality practices, and procedures etc. to be followed by the execution agency, during various stages of site activities right from receipt of materials/ equipment at site to commissioning stage covering receipt, storage, erection & pre-commissioning tests. It shall comprise of all tests / checks indicated in SFP & Technical Specification including any additional quality checks / tests required as per discussions (pre & post bid). It shall also take care of minimum basic requirement of OEM/manufacturer (as the execution agency may not be part of OEM/manufacturer). OWNER approved FQP is to be referred during execution of work. FQP shall have 5 stages: Receipt, Storage, Pre-erection/ pre-fabrication, Erection/ Execution and pre commissioning checks with categorization of checks as Critical (Cr), Major (Maj) and Minor (Mn). Typical format of Field Quality Plan is enclosed as Exhibit B.

5.5 In these approved manufacturing and field quality plans, OWNER shall identify "Customer Hold Points" & "Witness Points". "Customer Hold Points" are test/checks which shall be carried out in presence of the OWNER's Engineer or its authorized representative and beyond which the work shall not proceed without consent of OWNER/ its authorized representative in writing. "Witness Points" are tests/checks which shall be carried out in presence of the OWNER's Engineer or its authorized representative, but the work can proceed to next operation/ stage in case OWNER's Engineer doesn't attend on the mutually agreed date. The above procedure shall be applicable to the Bidder/ Supplier / Contractor's bought out equipment/ items also.

5.6 All the critical & major items shall be procured from the sub-vendors approved by OWNER. A tentative/ preferred list of sub-vendors for some of the items are indicated in Technical Specification. Based on which Bidder/Supplier/Contractor shall propose a list of sub vendors for bought out items for approval from OWNER. Detailed list of such sub-vendors offered by supplier/vendor/contractor shall be submitted not later than 7 days after the LOI/ Placement of order whichever is earlier and shall be frozen within 15 days of submission. Request for additional sub-vendors shall not be entertained from the

Bidder/ Supplier / Contractor after the sub-vendor list is finalized and frozen. Only in case of Force Majeure Condition, Supplier/ contractor shall establish such condition and propose new/ alternative source. Contractor / supplier shall provide requisite documents for consideration of OWNER. OWNER has right to accept/ reject based on review of details. If required, physical assessment shall be made before conveying such decision. Delays arising out of such exercises shall be entirely to the account of Supplier/ Contractor and shall not relieve him from any obligation, duty, or responsibility under the contract. For intended manufacturer/ sub-vendors/ sub-suppliers, credential / details to be submitted are as indicated below:

i. Company Profile.
ii. Name of the equipment proposed for approval with rating / capacity.
iii. Financial reports for the past 3 years.
iv. Organizational structure (including QA/QC set-up, workforce & qualification details).
v. In-house design capability, R&D facility & Technical collaborations (if any).
vi. In house manufacturing facilities (Including process flow charts).
vii. In house Testing facilities.
viii. Type Test Reports (as applicable).
ix. List of sub-suppliers for critical/major Raw material & bought out items.
x. In-coming material inspection plan and manufacturing quality plan.
xi. Certification by reputed agencies (ISO/ NABL/ NSIC/ ASME/ CE/ UL/API etc.) & government agencies (Factory licenses).
xii. Product approval certificates from other customers and regulatory Authority etc.
xiii. In case of non- ISO Company, details of quality system followed.
xiv. Experience (Past track records) for last 3 yrs. for similar product from the facility.
xv. Performance certificates issued by other customers.
xvi. Customer / Supplier complaints handling and resolution records.
xvii. After Sales / Services details
xviii. Details of out-sourced activities, if any.

5.7 Non-Conformance Report (NCR) / Quality Correction Action Report (QCAR): Wherever the non-conformity is found during inspection either by Supplier or OWNER or its representatives, NCR / QCAR shall be issued in prescribed format. Manufacturer /Supplier shall indicate the Correction / CAPA and submit these NCRs/QCARs to OWNER or its representative for their review & resolution. Till such time identified item/ equipment will be kept under quarantine. Upon satisfactory completion of the rectification work, final acceptance of the item/equipment shall be documented on the NCR/QCAR format.

Supplier must close all NCR / QCAR in systematic & time bound manner including all corrective and preventive actions. Job shall progress only after effective resolution of NCR / QCAR.

Note: If OWNER observes that any material or equipment is unacceptable with respect to potential safety, reliability, interchangeability or workmanship, OWNER shall issue a non-conformance report NCR / QCAR in this regard to the Supplier/ Contractor. Such NCR/QCAR shall be dealt as above.

5.8 No material shall be dispatched from the Bidder's/ Supplier's/ Contractor's /manufacturer's works before the dispatch instruction is given in writing by the OWNER, Subsequent to pre-dispatch inspection including verification of records of all previous tests/ inspections by OWNER/ authorized representative. Any such item/material

dispatched by party without clearance from OWNER shall be at suppliers' risk & cost only. No IRN/ dispatch clearance shall be issued for the same as post facto.

5.9 OWNER or its nominated representative reserves the right to carry out quality audit/ quality surveillance of the systems and procedures of the Bidder/ Supplier/ Contractor's or their sub-vendor's Quality Management System and control activities without prior intimation. The Bidder/ Supplier/ Contractor shall provide all necessary assistance to OWNER or its nominated representative to carry out such audit/ surveillance.

5.10 The Bidder/ Supplier/ Contractor shall be responsible for providing, controlling, calibrating, and maintaining the 'measuring & test equipment' required by them for demonstrating compliance of supplies within contract requirements at shop and at site. All the measuring instruments shall be calibrated at periodic intervals determined by Bidder/ Supplier/ Contractor/ sub-vendor based on suitability, purpose, and usage as per the system adopted for calibration of such measuring and test equipment. However, in no case, shall the interval between successive calibrations be more than 12 months. All measuring and test instruments shall have valid calibration certificates and calibration data shall be made available to OWNER or its nominated representative on demand.

5.11 Quality surveillance/ approval of the results of the tests and inspection shall not, however, prejudice the right of the OWNER to reject the equipment if it does not comply with the specification when erected or does not give complete satisfaction in service and the above shall in no way limit the liabilities and responsibilities of the Bidder/ Supplier / Contractor in ensuring complete conformance of the materials/ equipment supplied to relevant specification, standard, data sheets, drawings etc.

5.12 For all spares and replacement items, the quality requirements as agreed for the main equipment supply shall be applicable. Inspection of all mandatory spares and commissioning spares shall be in line with the approved MQP of respective equipment/item. Interchangeability Certificate shall also be part of quality records for all spares.

5.13 Statutory Inspection: Supplier to ensure that Equipment/ items which fall under statutory requirements of country where the equipment will be installed, shall be inspected by statutory authority like IBR etc. In case of imported items, statutory inspection will be carried out by the agency as nominated by Statutory Authority or Statutory authority of the country of origin. Original certificates endorsed by statutory authorities shall be submitted to Project Manager as identified in the contract. Such items shall also be offered to OWNER for inspection irrespective of country of origin.

5.14 Failure to Pass Tests: If any item/ equipment fails to pass any test, the Bidder/ Supplier shall rectify or replace the same and, unless OWNER agrees to dispense with repetition of the test, shall repeat the test following a further notice. The cost and expense of any such retest shall be fully borne by the Bidder/ Supplier only.

5.15 Major repair/rectification procedures to be adopted to make the job acceptable shall be subject to the approval of the OWNER/ its authorized representative.

5.16 All tests shall be carried out to the satisfaction of the OWNER/ its authorized representative either in their presence or as agreed by OWNER. All reports/ protocols,

site and shop inspection reports shall be developed specific to the requirements of the project which is acceptable to OWNER. The same shall be applicable to erection testing and pre-commissioning reports and protocols also. Only tested, inspected and accepted (by OWNER) material as listed in PO / ICP shall be dispatched to project site. Any diversion of such accepted material without any prior approval shall be considered as deviation/ breach of contract and a minimum penalty of five times the cost of inspection will be levied.

5.17 Approval of any concession shall be the prerogative of the OWNER and approval of concession for a particular case shall not be set as a precedent.

5.18 All the equipment shall be of proven design and type tested. Valid type test reports shall be furnished to engineering for review and acceptance prior to offering equipment for inspection.

5.19 All documents/ reports/ records shall be issued either in English language or bilingual with English.

6.0 INSPECTION CATEGORIZATION PLAN, WELDING & NDT REQUIREMENT

6.1 Inspection Categorization Plan (ICP)

This document shall be prepared by supplier and to be submitted to OWNER for approval in attached standard format for all package items within 15 days of award of contract.
The schedule shall be prepared considering that all MQP should be approved at-least 15 days prior to start of any manufacturing activity and FQP with related procedures shall be finalized at least 15 days prior to dispatch schedule/ site mobilization.

ICP, MQP, FQP and related procedures shall form part of Master Document List (MDL)

All the items/equipment in the scope of the contract shall be classified into categories (A/ B/ C) according to the criticality or other attributes of items / equipment. A detailed proposal addressing vendor approvals and quality control of all such items /equipment shall be proposed to OWNER by the Supplier/ Contractor for approval.

Category “A”: Manufacturing Quality Plan (MQP) shall be approved by Tata Power. Stage &/ or Final Inspection including document review by EPC Contractor and Tata Power (or its appointed Inspection Agency) as per approved MQP.

Category “B”: Manufacturing Quality Plan (MQP) shall be approved by Tata Power Stage &/ or Final Inspection including document review by EPC contractor or Tata Power (in case no EPC Contractor) as per approved MQP. Inspection report of EPC contractor/ Supplier with supporting documents review by Tata Power.
Category “C”: Supplier shall carry out inspection as per their regular practice/ standard manufacturing quality plan. Supplier shall submit test report and COC (Certificate of Conformance) to EPC Contractor/ Tata Power for approval/acceptance. COC shall be in standard format of Tata Power.

6.2 Welding & Non-Destructive Testing (applicable for shop as well project site)

6.2.1 Bidder / Supplier/ Contractor shall submit the following documents in requisite copies for review and approval of OWNER/ its authorized representative at least FOUR weeks prior to commencing fabrication/ manufacturing and finalize before start of job. All such submissions shall be made in ENGLISH language only.

i. Welding procedures together with the relevant procedure qualification records.
ii. Non-destructive testing procedures.
iii. Heat treatment procedures.
iv. Any other special procedure (as applicable) proposed to be used during project execution. Welding procedures and welders' qualifications in accordance with the latest revision of ASME Boiler & Pressure Vessels Code, Section IX, (structural welding as per AWS D1.1) or equivalent standard covering all essential & non- essential variables.
v. Welding Schedule.

6.2.2 Only qualified welders shall be deployed. Welders shall be qualified as per approved WPS in presence of OWNER/ its authorized representative. Electrode/ welding rod used at project site shall be of OWNER approved make. Supplier/ Contractor shall take prior approval.

6.2.3 Weld repair procedures are subject to approval of the OWNER. No welding is permitted on C.I. Castings. OWNER reserves the right to examine and witness acceptance tests, prior to and following weld repairs and subsequent post weld heat treatment, mechanical tests etc, at the material manufacturer/ Supplier works.

6.2.4 Should the welds prove to be defective on inspection, the number of welds to be tested in that system shall be twice that of originally selected. Should any of the second incremental welds prove to be defective, then 100 % of the welds in that system/ group shall be tested.

6.2.5 NDT operators shall be qualified in accordance with an agreed nationally accredited scheme such as the Personnel Certification in Non-destructive testing (PCN) scheme and shall be certified to level II or higher of that system.

6.2.6 Plate thickness ≥ 32mm (for structure), Plate thickness ≥ 25mm (for pressure vessel), Forging / Bar dia. ≥40mm (finished) shall be UT tested (Ultrasonic).

7.0 INSPECTION AT SHOP

7.1 Inspection Scope

The scope of inspection shall be as per Witness/ Hold Point as defined in approved MQP/ SQP. Supplier must ensure that all applicable and agreed approved Drawings, Data Sheet etc. are available for any inspection and equipment used for measurement are calibrated. Supplier shall intimate all such cases in advance (as inspection rolling plan) and through inspection call as per contract agreement.

7.2 Inspection Coordination

Supplier must identify single point of contact for coordination of the entire inspection activities on behalf of Supplier/ sub-supplier. Supplier to ensure that monthly and 3 monthly rolling inspection plans are prepared and submitted in advance to OWNER by 1st working day of each month for effective inspection coordination.

7.3 Inspection Request

7.3.1 Depending upon the stages of inspection as agreed in manufacturing quality plan, supplier to send Inspection Request through Wrench system with approved inspection reference documents, drawing, datasheet, procedures etc. to OWNER Project Manager for inspection activities to be attended at supplier's /sub-supplier's premises. Supplier to confirm the possibility for conducting remote inspection through Video calling system (preferably MS Teams), if required. Further, supplier to discuss & confirm the readiness of material by submitting internal test reports of the item/ equipment offered for inspection, job readiness pictures and testing schedule through email. Supplier must give sufficient advance notice, as defined below for inspection of any stage. Contractor/Supplier to strictly adhere to notice period indicated below and the testing schedule shared. Any additional expenses incurred due to the improper planning at supplier end for travel/ accommodation shall be in Supplier / Contractors scope.

7.3.2 The minimum advance notice period for inspection shall be given below:

i. Inspection within INDIA : 7 Days

ii. Overseas (Outside India) Inspection : 30 Days

Supplier to strictly adhere the above mentioned minimum advance notice period.

7.3.3 Supplier shall plan the inspection visits required in a manner to achieve maximum inspection stages attended with minimum possible inspection visits/ time where-in more than one external inspection agencies are involved for single inspection activity, inspection by all agencies may be done concurrently.

7.4 Inspection Methodology

7.4.1 Suppliers shall ensure internal inspection before offering inspection to OWNER or its representative. Internal test certificates and previous stage inspection reports to be submitted for review and made available during inspection.

7.4.2 During inspection, Supplier to produce copies of the latest revision of the approved MQP along with drawings, Data Sheet, Standard and accepted type test reports as indicated in approved MQP / agreement to ensure that the inspection is carried out as per the latest revision and approved documents. If required, supplier to arrange the necessary codes and standards for reference purposes.

In case inspection cannot be completed or undertaken due to reasons such as non-readiness of material, back up documents, false inspection calls etc. then such reason shall be recorded in inspection report. **If supplier fails to offer the item / equipment for inspection as per the agreed date, supplier is liable to pay for the time and expenses for the abortive visit of the OWNER or its representative.**

7.4.3 All inspection related documents i.e., mill test reports, supplier inspection/ tests reports, all inspection/ tests carried out including other records such as stress relieving charts, radiographic reports, and other non-destructive testing records in accordance with provision of contract shall be submitted in original form. All such reports shall be duly endorsed/ certified by the main supplier.

7.4.4 Results of tests and copies of inspection report, test reports, original material test certificates (MTCs), calculations, performance curves etc. shall be promptly made available to the OWNER or its appointed representative by the Supplier, in accordance with this document and shall form part of the subsequent Manufacturers Test Record Book in accordance with the requirements of this document.

7.4.5 Supplier to ensure that all the materials are properly identified/ coded to confirm traceability and correlation purposes.

7.4.6 Supplier shall take special care including packing to protect the final painting and finished product (equipment / item) during handling, transportation, storage, and execution stage so that there is no damage. In case of any such damage, joint inspection to be carried out at site and necessary action to be taken.

7.4.7 Supplier to ensure finish product is properly identified after completion of inspection and are suitably recorded in Inspection Report by inspection engineer.

7.4.8 Corrosion testing as per ASTM A262 Practice E for Austenitic Stainless Steel and ASTM A923 Practice A and C for Duplex Stainless-Steel components has to be carried out.

7.4.9 For rubber lining application, following checks shall be carried out on raw material for rubber – Grade identification, Tensile Strength, Elongation, Maximum Compression test, Ageing Test, Water Absorption test, Specific Gravity, Hardness, Ash Content, Bleed resistance, Ozone resistance test.

7.5 Inspection Report & Clearance

7.5.1 Inspection Report (IRT)

All inspection by OWNER or its appointed agency shall be supported by an inspection report as per the standard format (sample enclosed). Any shortcoming observed w.r.t. approved MQP/ Drawing/ Data Sheet / specification etc. shall be recorded as NCR. IRT shall have detail references of all such NCRs. All such inspection report / NCR shall be jointly signed by supplier and Inspection Engineer. IRT shall be issued to all concern

including Supplier and Sub-supplier/ Manufacturer. Same will be uploaded in Wrench system by OWNER.

7.5.2 **Inspection Release Note (IRN)**

IRN shall be issued through Wrench system to Project Manager of OWNER, only after satisfactory compliance for Inspection remarks.

IRN for Category 'A' item (as defined in ICP) shall be issued only after ensuring inspected Equipment / Item meets the requirements of the applicable documents and all NCs have been closed to the satisfaction of OWNER.

For Category 'B' items (as defined in ICP) IRN shall be issued through Wrench after review of supplier inspection report, compliance report and required applicable documents as per approved MQP & Closure of NCs if any are verified and accepted to the satisfaction of OWNER.

For Category 'C' items (as defined in ICP), IRN shall be issued through Wrench after review of original manufacturer test certificates, Certificate of Conformance (CoC) from supplier/contractor in OWNER standard format and required applicable documents as per MQP approved by main supplier / as per their standard procedure are verified and accepted.

7.6 **Material Dispatch Clearance Certificate (MDCC)**

Supplier shall obtain dispatch clearance certificate (MDCC) through Wrench from project / Plant Manager depending on the project progress and material requirement at site based on IRN prior to dispatch of any billable material/ equipment / item from Manufacturer place to OWNER Project Site / Plant. One set of Quality Dossier (hard copy) for which MDCC has been issued, shall be sent to project site along with material / equipment/ item.

MDCC is not required for material / equipment/ item/ Part supply which are dispatched from one sub-supplier works to another sub-supplier/ supplier works for further assembly and testing (to make it billable). However, clearance in the form of Inspection Report (IRT) is needed in this regard.

8.0 QUALITY DOSSIER (FOR SUPPLY PORTION) [Package wise]

Supplier shall compile and submit all stage and final inspection reports as per approved MQP, duly reviewed and endorsed by inspection engineer for reference and records of OWNER. Documents shall be submitted with-in 4 weeks of issuance of final MDCC.

Dossier shall consist of following documents, as minimum:

i. Index Sheet
ii. Approved bill of material of package.
iii. All Approved documents (MQP, Drawings & Data Sheet etc.)
iv. MDCC, IRN & IRT along with all closed NCR of all items.
v. Factory Acceptance Test (FAT) reports.
vi. Raw material and bought out item MTC's with raw material history/traceability sheet.
vii. Test Reports corresponding to IRT & MQP

viii. Supplier internal inspection reports as per MQP.
ix. Copy of Statutory and IBR certificates as applicable.

Note:

a. Each package compilation shall be done based on unit wise and common systems.
b. Each volume/ dossier shall be spiral/ hard bounded. Each sheet of dossier to have running numbers.
c. One hard copy (in addition to the dossier dispatch with material / equipment/ item) and 2 Soft copies of documents to be submitted as final dossier (shall also be uploaded in Wrench System for future reference.

9.0 FQC DURING CONSTRUCTION AND PRE-COMMISSIONING.

9.1 Supplier Quality Management System is applicable for field activities also and for his further sub agencies deputed at project / plant. Refer clause no: 5.0 (applicable part). Supplier/ Contractor shall deploy sufficient number of QA/ QC persons to take care of daily activities as per agreed/ approved Quality documents. Some of such activities are detailed below. Also, supplier Project Manager shall regularly co-ordinate with OWNERs FQC team.

9.2 Raising of inspection calls on regular basis for various activities as indicated in approved FQP/ other document, carrying out inspection activities along with OWNER's execution / FQC department and maintaining the records duly signed by all concerned.

9.3 Various inspection/ quality assurance procedures/ methods at different stages of erection and pre-commissioning will be as per OWNERs approved field quality plans/ codes/ IBR and other statutory provisions and as per OWNER’s engineer’s instructions.

9.4 Preparation of quality assurance log sheets and protocols, welding logs, NDE and post weld heat treatment records, testing & calibration records, and other quality assurance documentation as per OWNER’s engineer’s instructions is within the scope of work/ specification. These records shall be submitted to OWNER for approval from time to time.

9.5 A daily logbook of all measurements and testing/ calibration should be maintained by contractor on the job inspection details for various equipment. Contractor to depute competent engineer for site testing and pre-commissioning of equipment’s’ (as applicable).

9.6 All the workers of contractor / sub-contractor/it's agencies shall carry identity cards as per the Performa prescribed by OWNER. Only workers duly authorized by OWNER shall be engaged on the work.

9.7 Contractor shall provide all the measuring and monitoring devices (MMD) required for completion of the work satisfactorily. These MMDs shall be calibrated & conform to job requirement in respect of measurement range, accuracy level & any other specification.

9.8 Re-work necessitated on account of use of invalid MMD shall be entirely to the contractor’s account. Contractor shall be responsible to take all corrective actions,

including resource augmentation if any, as specified by OWNER to make-up for the loss of time.

OWNER's FQC team / QA representative will have the right to carry out Surveillance and Audit of supplier/contractor and their agencies including their store without any prior intimation.

9.9 Regular Internal audit shall be conducted by supplier/ contractor QA/QC team of their agencies and their other dept. Such audit reports shall be made available whenever asked for by OWNER FQC team. OWNER FQC/ QA have the right to carryout 2nd party audit of supplier/ contractor and their agencies as per predefined Audit schedule.

In course of work OWNER may counter/ finally check the measurements with their own MMDs. Contractor shall render all assistance in conduct of such counter check/ final measurements.

9.10 **Communication**

Direct, formal communication between the SUPPLIER's field QC and OWNER's field QC representative is mandatory. All inspection activities as per field quality plan shall be intimated to OWNER in the form of Request for Inspection (RFI) at least 24 hrs. in advance with intimation to OWNER execution group.

Whenever any major issues / deviations related to design or fabrications are noticed, the same shall be immediately informed to OWNER's field QC by supplier's field QC/ Supplier Project Head. On completion of above activity, joint inspection reports/ protocol shall be made and circulated to concern agencies. Any part of work at the site shall not be **covered up or made inaccessible** without the OWNER Representative's prior approval in the form of joint protocol or otherwise.

Contractor to prepare acceptance test records as indicated in field quality plan for all Minor/ Major /Critical checks or activities, such as site register for all storage and receipt of materials, erection protocol for pre-erection and erection activities, testing and commissioning records for all testing, commissioning and charging activity as indicated in the FQP for a particular equipment or system and approved by OWNER. All the critical checks mentioned in the field quality plan to be documented strictly and to be approved by OWNER. All the FQP related Documents shall be uploaded in Wrench, as part of handing over dossier.

Further, SUPPLIER/ Contractor's in-progress inspection reports, logbook, follow up/ punch out sheets; records of all DT & NDT etc. shall be made available to OWNER field QC during entire course of the work. At the end of the work, SUPPLIER/ Contractor's standard inspection reports, check off sheets, radiographs, master copy of loop diagrams, electrical testing data sheets, etc. shall be handed over to OWNER in an organized and agreed format. SUPPLIER/ Contractor shall verify that all the required documentation of the equipment has been received and placed in the equipment files. The SUPPLIER/ Contractor is responsible for obtaining any outstanding documentation from his sub-supplier/ agencies.

9.11 **Dealing with Open Punch Points (NCR/QCAR):**

All open points in the form of observations, non-conformities (NCR, QCAR etc.) that are not responded / closed in time as well as, those were not put up by supplier/ Contractor for resolution/ agreement to OWNER, the same will be considered as violation of contractual obligations and will be dealt suitably during closure of contract. Penalty clauses (if any) shall be applicable as per contract.

Supplier/ Contractor's Performance rating will be impacted as per prevailing policy of OWNER in this regard.

10.0 ATTACHMENT

i. Exhibit A – MQP Format
ii. Exhibit B – FQP Format
iii. Exhibit C – Shop Inspection Request Format
iv. Exhibit D – ICP Format
v. Exhibit E – IRN Format
vi. Exhibit F – Suggested MDCC Format
vii. Exhibit G – RFI Format (For Site Inspection Request)
viii. Exhibit H – NCR Format
ix. Exhibit I – QCAR Format
x. Exhibit J – Weekly Progress Report format

Supplier Logo	THE TATA POWER COMPANY LIMITED PROJECT NAME	TATA POWER
Supplier Document No	Supplier Name & Address	Document No Page 1 of 1

Document Title: MANUFACTURING QUALITY PLAN (MQP)

Document No:

Consultant:

EPC Contractor:

Manufacturer Name & Address:

R1					
R0					
Revision	Date	Reason for Revision	Prepared By	Checked By	Approved By

Supplier Logo Supplier Document No	**Manufacturing Quality Plan for …….** **Manufacturer Name & Address** **PACKAGE NAME**	Document No. *(As given by PDM, Tata Power)* Date & Revision Page .. of .....

SR. NO.	COMPONENT Description / Activity	CHARACTERISTICS	TYPE OF CHECK	EXTENT OF CHECK	REF. DOCUMENT / ACCEPTANCE NORM	FORMAT OF RECORD	AGENCY			REMARKS
							M	S/C	O	
1	2	3	4	5	6	7	8			9
1.0	MATERIAL:						P	R	R	
2.0	IN-PROCESS INSPECTION:									
3.0	FINAL INSPECTION:									
4.0	ISSUANCE OF IRN (BY REVIEWING OF QUALITY DOSSIER)									

NOTE

a). Statutory requirements will be complied by the contractor/ Supplier.
b). Material samples drawn for check testing will be witnessed by TATA POWER or its representative.
c). For stage inspections, copies of relevant documents will be furnished to TATA POWER for review.
d). The extent of check for manufacturer shall be 100%.
e). Column 6 will be as per TATA POWER approved drawings / data sheets / contact documents wherever applicable.
f). All instruments shall have valid calibration certificate with traceability to national level

Legends: M – Manufacturer, S – Supplier C – EPC Contractor, O – Owner (Tata Power), P – Perform, W – Witness, R – Documents Review, H – Hold point, Rw (%) – Random Witness

EPC Logo EPC Document No	**THE TATA POWER COMPANY LIMITED** **PROJECT NAME** **Contractor's Name & Address**	TATA POWER Document No Page 1 of 1

Document Title: FIELD QUALITY PLAN (FQP)

Document No:

Consultant:

EPC Contractor:

R1					
R0					
Revision	Date	Reason for Revision	Prepared By	Checked By	Approved By

TATA POWER	The Tata Power Company Limited Engineering (Generation)	TATA
Doc. No.:	STANDARD FQP FOR	Date of Issue:

Sr. No	COMPONENT / OPERATION	CHARACTERISTICS CHECKED	CLASS OF CHECK	TYPE OF CHECK	EXTENT / FREQUENCY OF CHECK	REFERENCE DOCUMENTS / ACCEPTANCE NORM	FORMAT OF RECORD	REMARKS
1	2	3	4	5	6	7	8	9

NOTE

A) STATUTORY REQUIREMENTS WILL BE COMPLIED WITH BY THE CONTRACTOR.
B) FOR STAGES WITNESSED / DOCUMENTS REVIEWED BY TATA POWER, COPIES OF RELEVANT DOCUMENTS WILL BE FURNISHED TO TATA POWER.
C). TATA POWER / ITS REP. IDENTIFICATION STAMP ON MATERIALS WILL BE PRESERVED / GOT TRANSFERRED BY TATA POWER / IT'S REP AT APPROPRIATE STAGES.(IF REQUIRED).
D). THE EXTENT INDICATED IN COLUMN 6 IS IN CONTRACTOR'S SCOPE.TATA POWER MAY INSPECT AS PER THIS COLUMN OR RANDOM SAMPLES AT IT'S DESCRETION.
E). COLUMN 7 WILL BE AS PER TATA POWER APPROVED DRAWINGS / DATA SHEETS / CONTRACT DOCUMENTS WHEREVER APPLICABLE.
F). INSTRUMENTS FOR LEAK TESTS AND PERFORMANCE TESTS WILL HAVE VALID CALIBRATION CERTIFICATE WITH TRACEABILITY TO NATIONAL LEVEL.

Critical Category is HOLD point.	This activity required inspection / Verification & acceptance by inspection authority responsible for this stage before further processing is permitted., 24 Hrs advance notice to be given to TATA POWER FQC. Contractor /sub contractor shall not process activity beyond HOLD point without written permission by TATA POWER FQC. This activity shall be performed by Main & Sub- Contractor (Execution + FQC) & witnessed jointly by TATA POWER (Execution + FQC). (Surveillance by Head FQC / Project Head).
Major Category is Witness point.	This activity required inspection / Verification & acceptance by inspection authority responsible for this stage before further processing. 24 Hrs advance notice to be given to TATA POWER (Execution) . Contractor /sub contractor shall not process activity beyond Witness point without written permission by TATA POWER (Execution). This activity shall be performed by Main and Sub- Contractor (Execution + FQC) & witnessed by TATA POWER Execution & Surveillance by FQC.
Minor Category is Review point.	This activity required review of documents by TATA POWER for the compliance & acceptance, However 24 Hrs advance intimation to be given to TATA power (Execution). This activity shall be performed by Main and Sub- Contractor (Execution +FQC) . (Surveillance by Execution / Project Head).
	TATA POWER reserves the right to carryout surveillance at any point of time through FQC.

WorkflowCompleted Printed By: AMAN GUPTA - 31/Jul/2025 - C

TATA POWER	The Tata Power Company Limited Engineering (Generation)	TATA
Doc. No.:	STANDARD FQP FOR	Date of Issue:

Sr. No	COMPONENT / OPERATION	CHARACTERISTICS CHECKED	CLASS OF CHECK	TYPE OF CHECK	EXTENT / FREQUENCY OF CHECK	REFERENCE DOCUMENTS / ACCEPTANCE NORM	FORMAT OF RECORD	REMARKS
1	2	3	4	5	6	7	8	9

STORAGE TYPE:

TYPE-1: OPEN AREA & ABOVE GROUND ON WOODEN PLANK WITH SLOPE FOR WATER DISPOSITION.
TYPE-2: OPEN AREA & ABOVE GROUND ON WOODEN PLANK (WITH SLOPE FOR WATER DISPOSITION) AND COVERED WITH TARPAULIN.
TYPE-3: OPEN SHED WITH FULLY FORMED FLOORING/CEMENT FLOORING.
TYPE-4: COVERED SHED/STORE ROOM ON RACKS & IDENTIFIED LOCATION.
TYPE-4A: CLOSED CHAMBER WITH TEMPERATURE & HUMIDITY CONTROL.
NOTE: Items/equipments having shelf life like paints, alumina, desiccant etc. are to be stored seperately for identification purpose.

Rev. No	Reason for Revision	Prepared By & Date	Checked By & Date	Approved By & Date	Issued By.
R0	ISSUE FOR USE				

Confidential and Proprietary -- The Tata Power Company Limited

WorkflowCompleted Printed By: AMAN GUPTA - 31/Jul/2025 - C

Exhibit - C

Request No:
Date:

TATA
TATA POWER

Engineering (Generation)

Shop Inspection Request Format

Project Name:	
Main Supplier	
Package Name:	
Tata Power P. O. / LOI No. Date	
Item / Equipment offered for inspection:	
Inspection Category:	**A / B / C**
Sub-supplier (Manufacturer) name & PO Number:	
Type of Inspection: (Please mention the stage number of MQP which will be completed during this inspection)	**Stage / Final**
Proposed Date of Inspection:	
Place of Inspection: (Please give complete address where material will be inspected, attach route map if required)	
Contact Person for this Inspection along with Mobile No.:	
MQP Doc. No.: **Rev. No.:** **MQP Approval Status:**	**Yes / No**
Inspection Reference Document No: **(Drawing/ Data Sheet etc.) approval status**	**Yes / No**
Tata Power PO Item numbers / Billing Breakup No./ Tag No (as applicable) and quantity to be inspected: (Please attach separate list if necessary)	
Current Manufacturing Status (in brief) of item / equipment being offered in this Inspection:	

We hereby confirm that the items have been fully inspected / tested by us, all stages of inspection as per approved MQP have been done and all material test certificates, Q.C. records, approved Drawing / Data Sheet, test reports and valid calibration reports of measuring / testing instruments with traceability are ready with us.

(Signature)

[Name & Designation of Contractor's Representative]

Supplier Logo Supplier Document No.	THE TATA POWER COMPANY LIMITED PROJECT NAME	TATA POWER Document No Page 1 of 1
	Supplier Name & Address	
	ICP - PACKAGE NAME	

Document Title: INSPECTION CATEGOROZATION PLAN (ICP)

Document No:

Consultant:

EPC Contractor:

Supplier:

Revision	Date	Reason for Revision	Prepared By	Checked By	Approved By
R1					
R0					

Document No: Given as per procedure of Tata Power

Supplier Logo Supplier Document No.	**THE TATA POWER COMPANY LIMITED** **PROJECT NAME** **Supplier Name & Address** **ICP - PACKAGE NAME**	TATA TATA POWER Document No Page 1 of 1

Sl. No.	Item Description	Imported / Domestic	Manufacturing / Bought Out	Manufacturing Quality Plan No. (No. given as per TATA Power Procedure)	Inspection Category	First Schedule Submission Date*	Final Approval Date*
1	Example: PUMP				A / B / C		
2							
3							
4							
5							
6							

*Dates indicated are for monitoring purposes of Tata Power Quality Team.

Category “A”	Definition: Manufacturing Quality Plan (MQP) shall be approved by TATA POWER. Stage &/ or Final Inspection including document review by EPC Contractor and TATA POWER (or its appointed Inspection Agency) as per approved MQP.
Category “B”	Definition: Manufacturing Quality Plan (MQP) shall be approved by Tata Power. Stage &/ or Final Inspection including document review by EPC contractor or Tata Power (in case no EPC Contractor) as per approved MQP. Inspection report of EPC contractor/ Supplier with supporting documents review by Tata Power.
Category “C”	Definition: Supplier shall carry out inspection as per their regular practice/ standard manufacturing quality plan. Supplier shall submit test report and COC to EPC Contractor/ Tata Power. COC shall be in standard format of Tata Power.
Note:	1. Any item which is not appearing in above list, however, identified during detailed engineering, same need to be categorized as above. 2. If supplier is not able to submit test report for any Category “C” item, same needs to be finalized during ICP approval.

Document No: Given as per procedure of Tata Power

Exhibit - E

	TATA POWER COMPANY LIMITED	Engineering (Generation)
TATA	Inspection Release Note	IRN No: Issue Date:

Project / Plant:	
Tata Power PO No.:	**Dated:**
Supplier & Sub-Supplier:	**Shop Location:**
Inspection Category as per MQP:	**A** ☐ **/ B** ☐ **/ C** ☐
Release Basis: **Physical Inspection** ☐	**Document Review** ☐
Inspection Waiver/ Inspection Category : Change Reference (if applicable)	

Material / Equipment Details:

PO Item / BBU No.	DESCRIPTION OF ITEM / EQUIPMENT	Tag / ID No. / S. No.	QUANTITY CLEARED EARLIER	OFFERED QUANTITY (Current Lot)	ACCEPTED QUANTITY (Current Lot)

Reference Inspection Report (s)/ Documents Index:

Identification mark with location:

Inspected By:

NCR Status: **OPEN** ☐ **CLOSED** ☐ **NIL** ☐

Special Comments (if any):

Results of Inspection:

Documents reviewed and certify that Inspection carried out as per the approved MQP / Engineering Documents/ Drawings.
Above Equipment/ Item (s) cleared for issuance of MDCC.

Document Reviewed By:*	*Approved By:*
Signature: **Name:** **Date:**	**Signature:** **Name:** **Date:** STAMP

Note:

1. Issuance of this report and acceptance of NC, if any are without prejudice to contractual obligations of the Supplier / manufacturer and does not absolve him from obligations and guarantees set forth in purchase order documents issued by Tata Power.
2. **This is Tata Power internal communication.** Project Manager/ Officer / User to ensure contractual, commercial & projects requirements before issuing Material Dispatch Clearance Certificate (MDCC) to contractor/vendor.
3. IRN shall be issued when all NC closed.

WorkflowCompleted Printed By: AMAN GUPTA - 31/Jul/2025 - C

Exhibit - F

THE TATA POWER COMPANY LIMITED

MATERIAL DISPATCH CLEARANCE CERTIFICATE

MDCC REFERENCE:			**DATE:**
PROJECT			
P.O. REF.			
PACKAGE		**QA "Clearance For MDCC" REF No.**	
SUPPLIER		**SUB-SUPPLIER**	

Dispatch clearance is hereby given for following equipment/ items:

Sr. No	PO Item No./ BBU	Item Description	Unit	Quantity	Identification/ S. No./ Remarks

PACKING AND DISPATCH INSTRUCTIONS		SUBMIT FOLLOWING TO TATA POWER			
1	Complete assembly with drive, base plate, accessories etc.	1	Quality Dossier	7	As built drawings.
2	Protect machined surfaces against corrosion.	2	Erection, O&M manual.	8	Calibration reports.
3	Blank nozzles and other openings.	3	T.C. for performance / leak tightness / balancing.		
4	Complete painting, affix name plates, tag no., sr. no., etc.	4	Performance calculations, curves.		
5	Pack to prevent damage/ deterioration in handling, transit & storage	5	Guarantee certificates.	9	Dispatch details.
6	Paint dispatch markings and weight.	6	Manufacturing Test Records/ Test Certificates/ COC		

(Please tick above Packing & Dispatch instructions and Documents Requirements as applicable)

Special Dispatch Instructions (If any):

	Prepared By:	Approved By:
Signature		
Name		
Designation		
Date		

NOTES:

1. Acceptance / release of the above items is without prejudice to the terms and conditions of the contract and does not relieve the CONTRACTOR/ SUPPLIER of his guarantees and responsibilities to supply the items in accordance with the specifications, approved drawings, data sheets and other relevant contract documents / conditions.
2. CONTRACTOR/ SUPPLIER shall comply with the packing and dispatch instructions and documentation requirements given above.

Exhibit - G

Engineering (Generation)

TATA POWER	Field Inspection Requisition	Requistion No.:
	Project :	Date:
	Name of package & Unit No:	
	Agency:	
	Sub Agency:	

INSPECTION/ TEST REQUISITION DETAILS

1. FQP No. with Rev. & Category of Approval	
2. Test reference of FQP	
3. Category of Test nas per FQP	
4. Applicable Drawing No. with Rev:	
5. Location	
6. Date and time for inspection / test	
7. Open QCAR/NCR No. (if any) & date against this item/equipment	
It is hereby certified that all previous tests / checks are cleared and no QCAR other than above is pending against this item / equipment (Signature) **Agency Representative**	(Signature) **OWNER (Execution)**

8. Post Inspection/ Test (Joint Protocol) : ACCEPTED / NOT ACCEPTED / ACCEPTED WITH CONDITION

Brief Description:

(Signature) **Agency Representative**	(Signature) **OWNER (Execution)**	(Signature) **OWNER (FQC)**

WorkflowCompleted Printed By: AMAN GUPTA - 31/Jul/2025 - C

	TATA POWER COMPANY LIMITED	Engineering (Generation)
TATA	Non Conformity Report	NCR No: Date

Project / Plant:	
Tata Power PO No.	**Package/Equipment:**
Supplier:	**Location:**
Inspection Report Reference:	**Date of issuance of NCR:**
Reference Documents: **(QA Manuals, Specification, Procedure, Drawing, etc.)**	

Requirements as per approved documents, codes and standards:

Details of NC (Provide complete description, i.e. what, where, how many , item no. etc):

Root Cause Analysis:

Corrective Action Proposed:	**Preventive Action Proposed:**
Supplier Representative Sign. / Date	Tata Power / TPIA Representative Sign. / Date

Engineering Review & Approval for proposed corrective action:

Engg. Representative
Sign. / Date

Corrective Action Taken:

Supplier Representative
Sign. / Date

Verification of Correction Action:

Tata Power / TPIA Representative
Sign. / Date

WorkflowCompleted Printed By: AMAN GUPTA - 31/Jul/2025 - C

Exhibit - I

TATA POWER	**THE TATA POWER COMPANY LTD** **ENGINEERING (GENERATION)** **QUALITY CORRECTIVE ACTION REPORT (QCAR)**	Format.No:QAI&T/QCAR Revision No.: B Revision Date: 17.01.18

Project / Plant:		Report No. & date: (From QA DC if issued by QAI)	
Contractor:		Supplier/Package/Equipment:	
Date of observation:		Date of issuance of QCAR:	
Discipline (Mechanical/Electrical /Civil/C&I):		Package in Charge:	
Issued From		Email ID	
Issued To		Email ID	

Quality Observations:

Supplier	Contractor's sign /Date & Time		TATA POWER COMPANY LTD	
Sign /Date & Time	Construction Rep	QA/QC Rep	Construction Rep	QC Rep.

Root Cause Analysis:

Correction Proposed:	**Corrective/Preventive Action (CAPA)Proposed:**

Sign of Supplier: Sign of Contractor:

Acceptance of Proposed Correction and CAPA (Obtaining comments from concerned group, if required)

Sign of Tata Power QC Rep:

Verification of Correction and CAPA taken as per approved proposal or not:

Sign of Tata Power Construction Rep: Sign of Tata Power QC Rep.:

Closure of QCAR (Conditional acceptance, if any to be indicated):

Sign of Tata Power Project Manager: Sign of Tata Power QC Rep:

Exhibit - J

Name of the Project
FQC Team

Name of the Project

Weekly Field Quality Report (00/00/2024 - 00/00/2024)

TATA POWER

FIELD QUALITY REPORT (CIVIL/ MECH./ELECT.)

A. FIELD INSPECTIONS

Sl. No.	Contractor/ Dept.	Work Area	FQ Activity/Test	UOM	Recd.	Acc.	Rep/Rej	Hold	Observations/Remarks

B. RA BILLS / GRN CLEARANCES

Sl. No.	Contractor/ Dept.	Package	Description	UOM	Recd.	Acc.	Rep/Rej	Hold	Observations/Remarks

C. QCAR'S RAISED / AUDIT / DELTAS

Sl. No.	Contractor/ Dept.	Package	Description	Date	Observations/Remarks

D. MEETINGS - INTERNAL AND WITH CONTRACTORS

Sl. No.	Contractor/ Dept.	Package	Date of meeting	Description

E. AREAS OF CONCERN

Sl. No.	Contractor/ Dept.	Package	Description

F. OTHER ACTIVITIES

Sl. No.	Contractor/ Dept.	Package	Description

Note: Areas of concern/highlights shall also include long pending and critical non-conformities.

Section B

Technical Requirement of Fire Protection and Detection System

Chapter No 15

Standard requirement of Diesel Engine

THE TATA POWER COMPANY LIMITED

STANDARD

TECHNICAL SPECIFICATION

FOR

Pumpset

(DOCUMENT NO - ENGG/ P&L/STD-SPEC/ 008)

Tata Power

Project Engineering

R0	18/7/2014	Issued For Info or Use	MP	JS	RSG
Rev. No	**Date**	**Description**	**Prepared By**	**Checked By**	**Approved By**

Contents

1. **SCOPE** 1
2. CODES AND STANDARDS 1
3. EQUIPMENT TECHNICAL SPECIFICATIONS 15
4. PERFORMANCE AND GUARANTEE TESTS 1
5. TESTS AND INSPECTION 5
6. SPARES 3

DATASHEETS A & B

1.0 SCOPE

1.1 This Specification covers the requirements of design, construction features, inspection and performance testing of Vertical Turbine Pumps, Diesel Driven Engine & Motor control panel.

2.0 CODES AND STANDARDS

2.1 The design, material, construction, manufacture, inspection, testing and performance of Vertical Turbine Pumps, Diesel Driven Engine & Motor control panel shall comply with HIS, NFPA 20. Nothing in these Specifications shall be construed to relieve the BIDDER of this responsibility.

3.0 EQUIPMENT TECHNICAL SPECIFICATIONS

3.1 General Requirements

3.1.1 Approved make for the Diesel Engine- KOEL/Greaves Cotton/Cummins.

3.1.2 The Bidder must submit foundation loads (dynamic and static), foundation GA along with bid.

3.1.3 The specified pump shall be supplied with the following items with but not limited to the following:

a) Diesel Engine and its accessories such as battery, battery charger, local control panel etc.

b) Gearbox and accessories between pump and Diesel Engine.

c) Foundation bolts and accessories for pumps and all equipments.

d) Companion flange for pump discharge complete with associated bolts, nuts and gaskets.

Size NB 50 & below	-	Forged Carbon steel as per IS:1875 Cl.2, with socket welded ends to ANSIB16.5-150 Lbs.
Size NB 65 & 150	-	Forged Carbon Steel as per IS 1875 Cl.2, slip - on type flange to ANSI B16.5-150 Lbs.
Size NB 200 and above	-	Fabricated form IS 2062 plate steel. Slip-on type to ANSI B 16.5-150 Lbs.

e) Base plate

f) Junction boxes for terminating instruments along with the interconnecting cables and power cables.

g) Any I&C item/equipment not specified but necessary for the pumping system to meet the functionality requirements of the Pumps.

h) Mandatory Spares as specified in Point no. 6, start-up / commissioning spares and maintenance and erection tools and tackles required for erection, commissioning and maintenance of the pump sets. Price of these items shall be indicated in the respective schedules.

i) Recommended spare parts (list of recommended spares along with prices shall be furnished separately).
j) Foundation Drawings for pumps and equipments
k) Static and Dynamic Load data
l) Forces and moments shall be mentioned in pump GA drawing

3.2 Diesel engines and accessories

3.2.1 Diesel engine:

a) The diesel engine shall be single acting, mechanical injection type and shall be furnished with at least the minimum equipment according to standard practice. The power rating, required auxiliaries, guarantees of fuel consumption, parallel operation, governor performance and torsional vibration shall be in accordance with ISO: 3046.
b) The engine shall be provided with an exhaust gas turbocharger having a charge air cooler, integral intake air filter and silencer.

3.2.2 Fuel oil system:

a) An overhead 'Day' tank of about 4 hours rated capacity or capacity which meets the Petroleum rules whichever is less shall be installed. The 'Day' tank shall be provided with a suitable electrical sensing device to signal 'low' oil level in the tank. A mechanical oil level indicator shall also be provided to indicate low and high levels. This tank shall in particular, conform to the requirements of IS:803 and API:650. A hand operated / motor operated transfer fuel pump with hoses / piping and other accessories shall be provided to transfer fuel oil to the day tank.
b) An engine driven booster pump shall be provided to deliver fuel oil from the supply line to the fuel oil injectors through 1 x 100 % duplex filters or 2 x 100% capacity individual filters. Differential pressure gauges across the filters or pressure gauges on either side of the filters shall be provided to monitor the cleanliness of filter.
c) An AC motor driven intermittent operation fuel oil priming pump if required shall be provided to keep the high pressure system primed with fuel for remote and quick starting at any instant. The pump shall be provided with a suitable clock timer for automatic operation at preset time intervals. A suitable pressure relief valve protective device shall also be provided.
d) Thermostatically controlled heaters shall be provided for heating the fuel oil, if ambient conditions warrant the same.

3.2.3 Lube oil system:

a) Automatic pressure lubrication shall be provided by engine driven gear type pump. The system should be complete with oil cooler and 1 x 100 % duplex fine-mesh filters or through 2 x 100% capacity individual filters. Differential pressure gauge across the filters or pressure gauges on either side of the filters shall be provided to monitor the cleanliness of the filters.

b) The oil cooler shall be either air or water cooled and shall be equipped with the necessary bypass to bypass the cooler during start up until the oil temperature reaches the pre requisite value.

c) Thermostatically controlled heaters shall be provided for heating the lube oil, if ambient conditions warrant the same.

d) An AC motor driven intermittent operation pre lube oil pump shall be provided. This pump in conjunction with a suitable clock timer shall supply lube oil intermittently to the engine when the engine is not in operation to keep the system primed with lube oil for remote and quick starting at any instant. A suitable pressure relieve valve protective device shall also be provided.

3.2.4 Jacket water system:

a) Jacket water system shall be complete with air or water-cooled heat exchangers, thermostatic control with alarm on high jacket water temperature, expansion tank complete with wall brackets. During start up, jacket water shall bypass the heat exchanger until the required temperature is reached. Thermostatically controlled jacket water preheater shall be supplied, if ambient temperature conditions warrant the same.

b) For the charge air cooler and lube oil cooler, the cooling water flow to the charge-air cooler shall be thermostatically controlled.

3.2.5 Electric Starting System:

a) The electric starting system shall comprise of starter motor, starter batteries and battery charger and all the required instruments and accessories.

b) Electric starting device shall take current from the storage batteries. The main battery contactors supplying current to the starting motor shall be capable of manual mechanical operation to energize the starting motor in the event of control circuit failure. Necessary auto / manual selector switch shall be provided on the diesel engine control panel.

c) Each engine shall be provided with two storage battery units. Each battery unit shall have twice the capacity sufficient to maintain the cranking speed recommended by the engine manufacturer through a 3-minute attempt-to-start cycle, which is six consecutive cycles of 15 seconds of cranking and 15 seconds of rest.

d) Battery Charger shall be specifically listed for fire pump service. The battery charger shall be of a type that automatically reduces the charging rate to less than 500 mA when the battery reaches a full charge condition. The battery charger shall restore to the battery 100% of the battery's reserve capacity or ampere-hour rating within 24 hours.

e) Storage batteries shall be rack supported above the floor or stand mounted, secured against displacement, and located where they will not be subject to excessive temperature, vibration, mechanical injury, or flooding with water.

f) Suitable hydro meter shall be provided for testing the specific gravity of the battery electrolyte. A voltmeter should be provided and installed so that the voltage of the batteries may be ascertained.

3.2.6 Air intake and exhaust system:

a) The BIDDER shall provide an air intake filter and silencer (if required). Air shall be taken from the diesel engine room.

b) The exhaust shall consist of an exhaust driven turbocharger with lagged piping interconnecting cylinder head outlets with the turbocharger inlet. Exhaust manifold shall be of fabricated steel and it shall be suitably lagged. Exhaust gas from the turbocharger shall be led through an exhaust gas silencer. The exhaust gas silencer, necessary pipes, adapters, etc. shall be provided by the BIDDER.

c) The exhaust gas pipe shall be led to the atmosphere at a minimum of 3 meters above the building where the diesel engine is installed. The exhaust pipe shall be insulted for personal protection up to a safe height.

3.2.7 Governing system:

a) The governor shall be Woodward type EGB-10 or approved equal. The governor characteristics shall comply with the requirements of 'Class A 1-governing' of ISO 3046.

b) The governor shall have the following features:

- An over speed trip mechanism shall be provided to automatically shut off fuel in case the set speed reaches about 110% of rated speed. The values at which the mechanism trips the engine shall be adjustable.
- An engine mounted emergency stop push button shall be provided which, when operated shall trip the engine.

3.2.8 Control system for diesel engine:

a) The engine control system is designed to offer a combination of manual and fully automatic control in starting of diesel engine.

b) Tripping of the diesel set for a normal shut down shall be done manually, by means of push buttons.

c) It should be possible to shut down the diesel engine either through the local push button on the diesel control panel or through the remote push button. The trip impulse should directly go to the engine shut down device without passing through the local/remote selector switch.

d) The diesel engine shall be tripped automatically under the following abnormal conditions:

- Over speed of diesel engine set as sensed by over speed trip device.
- Low lubricating oil pressure after engine has attained 90% speed
- Incomplete start after a preset time

- High jacket water temperature
- Emergency stop
- Any other tripping condition required for the safe operation of the engine

3.2.9 Control panels:

a) Suitable control panel comprising of necessary auxiliary relays, pushbuttons, control switches, etc. with complete panel internal wiring shall be provided by the BIDDER. Once the start push button is pressed or starting impulse is given (in the case of automatic starting), complete starting sequence shall be automatically disengage and stop after the engine picks up speed. When the engine stops all the controls shall automatically be reset to its normal starting operation.

b) Annunciators shall be supplied by the BIDDER and mounted on each diesel control panel to give visual and audible indication for the following conditions:

- High jacket water temperature and trip
- High lubricating oil temperature
- Low lubricating oil pressure and trip of the engine
- Fuel oil day tank level low
- Engine over speed and trip
- Failure to start

Four (4) Nos. spare windows shall be provided.

c) Each annunciator system shall be provided with:

- One push button for acknowledging the audible alarm (visual indication shall persist
- One push button for resetting the visual indication after the fault has been cleared
- One push button for testing the illuminated transparencies

d) On the occurrence of a fault the audible alarm shall sound and the appropriate window shall light up. The audible alarm shall be silenced by pressing the 'acknowledge' push button. The visual indication shall, however, persist until the relevant fault contact has reset after which the visual indication can be reset by the 'rest' push button.

e) After acknowledgement of one trouble by the 'acknowledge' push button, the alarm circuit shall be ready to operate for another fault.

f) The BIDDER shall provide all the sensing devices at the diesel engine for the above alarms and accessory relays at the control panel. Suitable name plates shall be provided for each window.

g) Bidder shall provide Ammeter and Voltmeter to indicate charging current and charging voltage respectively.

3.2.10 Instruments for engine:

The following instrumentation shall be provided

a) Dial type thermometers shall be provided as follows:
   - Lube oil outlet temperature from bearing
   - Lube oil temperature at lube oil cooler inlet/outlet
   - Jacket water temperature at cylinder outlet
   - Jacket water temperature at jacket water heat exchanger outlet
   - Jacket water temperature at the outlet of oil cooler (if applicable)

b) Pressure gauges shall be provided as follows:
   - At the discharge of all auxiliary pumps provided with the diesel engine
   - At the lube oil cooler outlet
   - On air receiver
   - At the jacket water inlet to engine
   - Differential pressure gauges across lube oil and fuel oil filters or separate pressure gauges on either side of the filters

c) Pressure switches shall be provided for automatic starting of the DC motor driven standby lube oil pump on low lube oil pressure.

d) Pressure switches shall be provided for lube oil system to give on alarm if the pressure falls below a preset value and subsequently trip the unit when the minimum safe pressure limit has been reached.

e) A thermostat shall be provided at the lube oil outlet from engine bearing for alarm on high oil temperature.

f) Tachogenerator shall be provided.

g) Primary sensing devices, control valves, controller etc. for:
   - Lube oil temperature and pressure
   - Engine jacket water temperature
   - Fuel oil day tank low level

h) Leads from all the sensing devices and instruments to which the PURCHASER's cables (from the engine to the diesel control panel) shall be connected shall be neatly brought to terminal blocks. The terminal block shall be properly identified.

3.2.11 Piping, valves and fittings:

a) All necessary interconnecting piping, valves and fittings, supports, filters and strainers shall be provided for lube oil, fuel oil, jacket water, cooling water and starting air systems. Terminal points shall be as indicated in Section-C. The piping shall be designed, fabricated and tested in accordance with ANSI. B 31.1- Pressure piping code or approved equivalent.

3.2.12 Heat exchanger:

a) The heat exchangers for cooling lube oil and jacket water shall be either of the following type unless otherwise specified.
   - Shell and tube type, conforming to TEMA-C or approved equal.

- Air cooled radiator type, provided with either engine driven or AC motor operated fans, complete with inlet screens, dampers, ducting.

3.3 Instrumentation

Instrumentation and control system shall be provided for the safe, reliable and efficient operation of Diesel Engine driven pump. The system shall include a local control panel cum distribution board which may be located in pump house for the operation and monitoring of the Diesel Engine driven pumps. The scope shall include supply and erection of the various necessary instruments from the below specified ones.

3.3.1 **Local Control Panel cum DB (LCP)**

Indoor located, free standing vertical type local panel with 2 mm thick sheet material of cold rolled steel; anti vibration pads of 15 mm thick; fluorescent lighting; Double doors with neoprene gaskets at every 1.5 m; blower & louvers with brass mesh; fire proof compound (50 mm thick) for sealing cable entry (bottom); space heater with thermostatic control (strip type). IP 65 degree of protection for enclosure shall be provided. Fluorescent lamp of 40W shall be provided and shall be operated by the door switches. Nameplates shall be provided for all instruments/inserts with Tag. No. & short description of service engraved. These shall be phenolic overlays (1.6 mm thick), black background with white lettering & shall be fixed to the panel by stainless steel screws (counter sunk). The panel shall be provided with one each 3 pin receptacles for 240V AC, 50Hz. Panel shall be delivered totally wired. All panel mounted instruments (push buttons, illuminated lamps, digital meter) shall be mounted in the same panel.

3.3.2 **Digital Meter**

To display the digital value of analog process parameter (level transmitter and pH meter) with sign and decimal point of the analog input assigned. Accuracy shall be ±0.25% of reading; type of display – LED; Seven segment; five digits, sign and decimal point; digit size shall be minimum of 50mm; colour of display shall be Red or Green; enclosure shall be IP32 or equal; all digital meters shall be mounted on the LCP. The digital meter shall be DC powered.

3.3.3 **Level Transmitter**

Ultrasonic level transmitter shall be provided for the settling chamber. Accuracy shall be ±0.3% of reading with local LCD display. IP 65 or equivalent degree of protection for enclosure shall be provided. Flange and other wetted parts material shall be SS316. Auto echo suppression, temperature compensation shall be provided. The transmitter shall be loop powered with 4-20mA isolated output. The transmitter housing shall be polyurethane coated aluminium. Accessories like name plate shall be SS.

3.3.4 **Level Switch**

External cage magnetic float operated level switches for dosing tanks and top mounted level switch for settling chamber. The top mounted level switches shall be supplied with still tubes to suit the requirement.. Material of float & float chord shall be 316 SS & cage material shall be fabricated steel and the material of accessories shall be SS. IP 65 or equivalent degree of protection for enclosure shall be provided. Micro switch with minimum 2 SPDT contacts rated for 0.2 A, 220 V DC Also, the instrument shall have the facility to independently set two different set points and wire it out the alarm / interlock etc through two independent set of potential free contacts. The number of SPDT contacts shall be considering this requirement and also at least one mounted spare.

Accessories like name plate, drain valve for external cage type level switches, mating flanges, gaskets, fasteners, bolts & nuts, etc. shall be supplied.

3.3.5 Level Gauge

Float and dial type level gauge shall be provided for the settling chamber. The float and other wetted parts shall be SS316. Tubular type level gauges for dosing tanks with automatic ball check valves; illuminator (240V AC) tempered toughened borosilicate glass, brass guard rods & brass holders. Body material: 304SS. Accuracy- +/- 2% with vertical scale. Material of accessories (name plate, etc.) shall be SS. Tubular glass OD shall be 5/8". Vent & drain valves shall be provided. Connection shall be screwed or flanged (ANSI class 150 RF).

3.3.6 Pressure Gauge

Direct reading, pipe mounted Pressure gauges of die-cast aluminium body, with 6 inch (150mm) phenolic dial (white dial with black numerals), 316 SS Bourdon type for high pressure application and 316SS Diaphragm/bellow for low pressure applications, AISI 304 movements and micrometer type adjustable aluminium pointer with accuracy of +/-1.0% of span including accessories like snubbers for pump discharge applications and chemical diaphragm for corrosive services and name plate, etc. Material of accessories shall be SS. IP65 or equivalent degree of protection for enclosure shall be provided. Over range protection shall be 50% above maximum pressure. Process connection shall be ½''NPT (F). Armoured capillary of 15 M shall be provided as required.

3.3.7 Temperature Measurement

Duplex type, PT – 100, with accuracy of +/-0.5% of span, response time 1-2 seconds; Spring loaded mineral insulated three (3) wire RTD assembly housed in aluminium casing (epoxy coated) having a process connection of M33 x 2 thread with 316 SS thermowell as applicable, IP65 or equivalent degree of protection for enclosure. Material of accessories (name plate, etc.) shall be SS. Element lead size shall be 18 AWG. The insulation resistance at 540 Deg C shall not be less than 5M ohms. Repeatability over full range shall be better than 0.02%. RTDs shall be ungrounded. RTD shall be supplied as an assembly ANSI 19.3 (latest) requirements. Both the elements of the RTD shall be wired to JB.(Qty- 2 nos: excluding Bidder's requirements)

4.0 PERFORMANCE AND GUARANTEE TESTS

4.1 Diesel Engine:

4.1.1 The following items of performance shall be guaranteed by the BIDDER in respect of the diesel engine units and the auxiliaries, when operating under the specified site conditions:

- Net output at engine shaft
- Fuel oil consumption at full load
- Lubricating oil consumption at full load
- 10% overload for one hour without overheating or showing signs of undue stress and within specified frequency variation
- Vibration and noise levels
- Governor response, overspeed trip and overspeed capability

5.0 TESTS AND INSPECTION

5.1 Following are Mandatory Spares for Diesel Engine:

1.	Sprayers/Injector	One (1) set
2.	Piston rings & sealing rings	One (1) set
3.	Exhaust valve assembly	One (1) set
4.	Springs (Valves)	One (1) set
5.	Packing and gaskets	One (1) set
6.	Fuel oil filter elements with seals	One (1) set
7.	Fuel oil filter assembly	One (1) set
8.	Lube oil filter elements with seals	One (1) set
9.	Scrapper rings	One (1) set
10.	Solenoid coil for fuel valve	One (1) set
11.	Big end and small end bearing of connecting rod	One (1) set
12.	Rubber hoses of water line with mounting clamps	One (1) set
13.	Cranking starter assembly complete	One (1) set
14.	Lube oil and fuel oil hoses with end connectors	One (1) set
15.	Water pump belts	One (1) set

DATA SHEET 2A
(Datasheet A of Diesel Engine)

Sr. No.	Description	Units	Values
1	General Data		Diesel Engine driven Fire water pump
1.1	No.of Engines	Nos.	1
1.2	Equipment to be driven		Fire water Pump
2	Design Data		
2.1	Design code		IS 10001
3	Accessories		
3.1	Fuel Oil System	--	Yes
3.2	Oil Lubrication system		Yes
3.2.1	Pumps		Yes
3.2.2	Filters		Yes
3.2.3	Lube Oil Pump		Yes
3.2.4	Valves, Piping and Fitting		Yes
3.3	Speed governing system		Yes
3.4	Self-starting system		Yes
3.5	Lubricating oil pressure gauge		Yes
3.6	Tachometer for engine RPM measurement		Yes
3.7	Batteries		Yes

3.8	Automatic controlling arrangement for battery charger		Yes
3.9	Battery charger		Yes
3.10	Exhaust piping from silencer to the outside of pump house included in scope of supply		Yes
3.11	Day tank for fuel oil having capacity to run the engine continuously for four hours		Yes
Note : Make and Model of Engine offered shall be of conforming to TAC regulations.			

DATA SHEET 2B
(Datasheet B of Diesel Engine)

Sr. No.	Description	Units	Values
1	General Data		
1.1	Make, Model		
1.2	Type of Engine		
1.3	No. of Engines	Nos.	
2	Design Data		
2.1	Engine rating at site	KW/HP	
2.2	Maximum Engine rating at site	KW/HP	
2.3	Derating factors:		
2.3.1	Altitude	%	
2.3.2	Inlet air temperature	%	
2.3.3	Humidity	%	
2.3.4	Cooling water temperature	%	
2.3.5	Overall derating factors	%	
2.4	Period of maximum engine rating	Hour	
2.5	Operating speed	RPM	
2.6	No. of strokes/cycle		

2.7	No. of cylinders		
2.8	Arrangement of cylinders		
2.9	Rotation direction (viewed from free end)		
2.10	Compression ratio		
2.11	Supercharging air pressure at rated load	Mm of Hg	
2.12	Firing order (viewed from power take off end)		
2.13	Jacket water temperature at rated load Inlet / Outlet	Deg C	
2.14	Jacket water pressure	Kg/cm^2	
2.15	Fuel system injector pressure	Kg/cm^2	
2.16	Fuel system booster pump pressure	Kg/cm^2	
2.17	Lube oil pressure at pump discharge	Kg/cm^2	
2.18	Lube oil temperature at pump in engine sump	Deg C	
2.19	Minimum acceptable lube oil temperature at start up	Deg C	
2.20	Maximum acceptable lube oil pressure at start up	Kg/cm^2	
2.21	Maximum period for which the engine can operate without cooling water supply	Min.	
3	Constructional Features of Engine		
3.1	Material of Construction		
3.1.1	Bed plate		
3.1.2	Crankcase housing		

3.1.3	Cylinder head		
3.1.4	Cylinder liners		
3.1.5	Crank shaft		
3.1.6	Connecting rods		Semi open/Enclosed
3.1.7	Connecting rod bearing		Flexible/Rigid
3.1.8	Pistons		Self
3.1.9	Fly wheels	No.	
3.2	Moment of inertia of flywheel	Kg/m^2	
3.3	Supercharger		
3.3.1	Type		
3.3.2	Manufacturer		
3.3.3	Number		
3.3.4	Drive		
3.3.5	Speed	RPM	
3.3.6	Lubrication		
3.3.7	Bearing cooling		
3.4	No. of inlet valves/cylinder head		
3.5	No. of exhaust valves/cylinder head		
3.6	Fuel oil system		

3.6.1	Type		
3.6.2	Filters		
	a) Type		
	b) Number		
	c) Location		
3.6.3	Engine drive booster pump		
	a) Type		
	b) Rating		
3.6.4	Injection Pumps		
	a) Type		
	b) Number		
3.6.5	Injection		
	a) Type		
	b) Cooling		
3.6.6	AC motor driven priming pump, if any		
	a) Type		
	b) Rating		
3.6.7	Day tank		
	a) Capacity	Ltrs	

	b) Material		
	c) Location		
3.6.8	Characteristics of fuel oil to be used		
3.7	Lube oil system		
3.7.1	Type		
3.7.2	Filters		
	a) Type		
	b) Number		
	c) Location		
3.7.3	Engine driven lube oil pump		
	a) Type		
	b) Rating		
3.7.4	DC motor driven standby pump, if any		
	a) Type		
	b) Location		
	c) Rating		
3.7.5	AC motor driven priming pump, if any		
	a) Type		
	b) Rating	KW	

3.7.6	Lube oil tank		
	a) Capacity	m^3	
	b) Material		
	c) Location		
3.7.7	Grade of lube oil to be used		
3.8	Jacket water system		
3.8.1	Type		
3.8.2	Quantity of water to be used	m^3/hr	
3.8.3	Make up tank		
	a) Capacity	m^3	
	b) Material		
	c) Location		
3.8.4	Engine driven pump		
	a) Type		
	b) Rating	KW	
3.8.5	Bypass control valve		
	a) Type		
	b) Location		
3.8.6	Radiator		

	a) Rating of radiator fan	KW	
3.9	Air Intake system		
	a) Intake filter type		
	b) Location		
3.10	Exhaust gas system		
3.10.1	Manifolds		
	a) Location		
	b) Size		
	c) Material		
3.10.2	Expansion joints		
	a) Number		
	b) Type		
	c) Location		
	d) Material		
3.10.3	Exhaust silencer		
	a) Type		
	b) Location		
3.11	Terminal Piping		
3.11.1	Day oil tank		

	a) Size		
	b) Type		
3.11.2	Lube oil heat exchanger		
	Cooling water In		
	a) Type		
	b) Location		
	Cooling water Out		
	a) Size		
	b) Type		
3.11.4	Jacket water heat exchanger		
	Cooling water In		
	a) Type		
	b) Location		
	Cooling water Out		
	a) Size		
	b) Type		
4	Performance Guarantee		
4.1	Net electrical output at Engine shaft at site after engine derating factors ad auxiliary power requirements have been taken into account		

4.2	Specific Fuel oil consumption	^{O}C	Ambient
	a) Full load	g/KWhr	
	a) 75% load	g/KWhr	
	a) 50% load	g/KWhr	
	a) 25% load	g/KWhr	
4.3	Lube oil consumption at rated load	Ltrs/hr	
4.4	Jacket water temperature 'IN' to Engine	Deg C	
4.5	Jacket water temperature 'OUT' from Engine	Deg C	
4.6	Lube oil temperature 'IN' to Engine	Deg C	
4.7	Lube oil temperature 'OUT' from Engine	Deg C	
4.8	Vibration Level	mm/s	
4.9	Noise level (at 1 m from outline of Engine)	dBA	
5	Dimensions		
5.1	Shipping dimension of Engine		
5.2	Dimensions of day oil tank		
5.3	Maintenance space required around the Diesel Engine		

C1 - SCHEDULE OF QUANTITIES AND PRICES

Sr. No	Item Description	UOM	Qty	Supply Price	Service Price
1.o	Design, Engineering, Manufacturing, Inspection and testing, insurance, transportation to site, unloading and handling at site, storage, erection, supervision, pre-commissioning, completion of facilities etc., conducting performance guarantee test and handing over to Tata Power of complete fire fighting system as described in Engineering specification no GE00528-00-V001-M-SP-001 including extending all necessary support to obtaining No Objection Certificate from local authority to Tata Power & as per NFPA / TAC / NBC Guidelines.	Lot	1		

Seal of the Company

Signature

C2- PROJECT TIME SCHEDULE

Seal of the Company

Signature

Designation

Note: The bidder shall indicate schedule of milestones and also attach/furnish a detailed bar chart identifying customer inputs.

C3- SCHEDULE OF DEVIATIONS FROM TECHNICAL SPECIFICATIONS

All deviations from this specification, shall be set out by the Bidders, indicating clause no and page in this schedule. Unless ***specifically*** mentioned in this schedule, the tender shall be deemed to conform to the purchaser's specifications:

Sr. No.	Clause No.	Details of deviation with justifications
--------	----------	----------

We confirm that there are no deviations apart from those detailed above.

Seal of the Company

Signature

Designation

C4- SCHEDULE OF DEVIATIONS FROM GENERAL & SPECIAL CONDITIONS OF CONTRACT

All deviations from this specification, shall be set out by the Bidders, indicating clause no and page in this schedule. Unless ***specifically*** mentioned in this schedule, the tender shall be deemed to conform to the purchaser's specifications:

Sr. No.	Clause No.	Details of deviation With justifications
--------	----------	----------

We confirm that there are no deviations apart from those detailed above.

Seal of the Company

Signature

Designation

C5- SCHEDULE OF DRAWINGS & DOCUMENT SUBMISSION

As part of the proposal, the BIDDER shall furnish the schedule of drawing/document submission

Sr. No.	Title of Drawing/Document	Target Date of submission	For Information/Review/Approval	Remarks
1.0	Overall Dimensions			
1.1				
1.2				
2.0	Layout			
2.1				
2.2				
3.0	SLD/ P&ID			
3.1				
3.2				
4.0	GA of Equipment/Skids			
4.1				
4.2				
5.0	O & M Manual			
5.1				
5.2				

Seal of the Company

Signature

Designation

Note: The titles of drawings / documents listed out in the schedule are examples. The bidder shall list out all relevant drawings / documents.

C6- SCHEDULE OF RECOMMENDED SPARES

As part of the proposal, the BIDDER shall indicate below the list of recommended spares for three years of trouble free operation of the equipment/system offered by him.

Sr. No.	Equipment tag no.	Description of spare	Material of construction	Part no	Quantity recommended per unit of equipment	Unit price	Total price	Delivery period from date of LOI	Remarks

Seal of the Company

Signature

Designation

C7 - SCHEDULE OF SPECIAL ERECTION/MAINTENANCE TOOLS & TACKLES

As part of the proposal, the BIDDER shall indicate below, the list of erection/maintenance tools & tackles offered by him.

Sr. No.	Description of spare	Quantity recommended per unit of equipment	Unit price	Total price	Delivery period from date of LOI	Remarks

Seal of the Company

Signature

Designation

C8 - SCHEDULE OF PLACES OF MANUFACTURE, TESTS AND INSPECTION

For major equipment / systems, the Bidder shall indicate the name of the Manufacturer / SUBCONTRACTOR and place of test and inspection.

ITEM OF EQUIPMENT	Manufacturer / SUBCONTRACTOR	PLACE OF TESTING & INSPECTION

Seal of the Company

Signature

Designation

C9- SCHEDULE OF MANDATORY SPARES

The Bidder shall indicate the price for the mandatory spares specified here in.

1.0	**FIRE HOSES WITH COUPLINGS**		
1.1	7.5m long fire hoses with end connectors	5% of Total population	
1.2	15m long fire hoses with end connectors	5% of Total population	
2.0	**BRANCH PIPES WITH NOZZLES**		
2.1	Nozzles with branch pipes & quick coupling ends	5% of Total population	
3.0	**DELUGE VALVE ASSEMBLIES**		
3.1	Complete deluge valve assembly along with internals and accessories of each size used in this project	Nos	1
4.0	Gate Valve of each size used	Nos	1
5.0	Butterfly Valve of each size used	Nos	1
6.0	Non Return Valve of each size used	Nos	1
7.0	Y – Type Strainer of each size used	Nos	1
8.0	MVWS Nozzle of each type used	10% of Total population	
9.0	HVWS Nozzle of each type used	10% of Total population	
10.0	QB Detector of each type Used	10% of Total population	
11.0	Hydrant Valve of each type used	10% of Total population	
12.0	Water Monitor of each type used	1 Nos	
13.0	Fire detectors of each type used	10% of Total population	
14.o	Notification devices used in the Fire alarm system	10% of Total population	
15.0	**PORTABLE EXTINGUISHERS**		
15.1	Pressurised Water type (9 lit. cap.)	Nos	2
15.2	Foam Type (9 lit. cap.)	Nos	2
15.3	CO2 Type (4.5 kg cap.)	Nos	2
15.4	Dry Chemical Type (ABC type, 6 kg cap.)	Nos	4
16.0	**MOBILE EXTINGUISHERS**		
16.1	Foam type (50 lit. cap.)	Nos	1
16.2	CO2 Type (22.5 kg cap.)	Nos	1
16.3	Dry Chemical Type (ABC type, 50 kg cap.)	Nos	1
17.0	**FIRE ALARM PANEL & REPEATER FIRE ALARM PANEL**		
17.1	Power supply modules	10% or 1 no. of each type & rating whichever is more	
17.2	Control modules, loop cards modules, isolator cards, monitor modules, NO /NC contacts. Contact cards.	10% or 1 no of each type, whichever is more.	

17.3	LCD display of each type unit of panel	1 No.
17.4	Interface unit / modules for non-addressable devices, auxiliary / output relay modules, control modules, supervisory control modules and any other electronic modules	10% or 1 no of each type whichever is more.
17.5	LED's of each type	100% of population.
17.6	Detector of each type, make & model	10% of population
17.7	LHS cable	25% of total Length
20.0	Mandatory spares for electrical items as per ENGG/ P&L/STD-SPEC/ 010 'Standard specification for switchgear"	1 lot
21.0	Mandatory spares for Pumps, Motors & diesel engine as per specification ENGG/ P&L/STD-SPEC/ 008 "Standard specification for Pumps, Motors & Diesel engine"	1 lot
22	Mandatory spares for PLC panel as per specification.	1 lot

Seal of the Company

Signature

Designation

Section D

Annexure 1

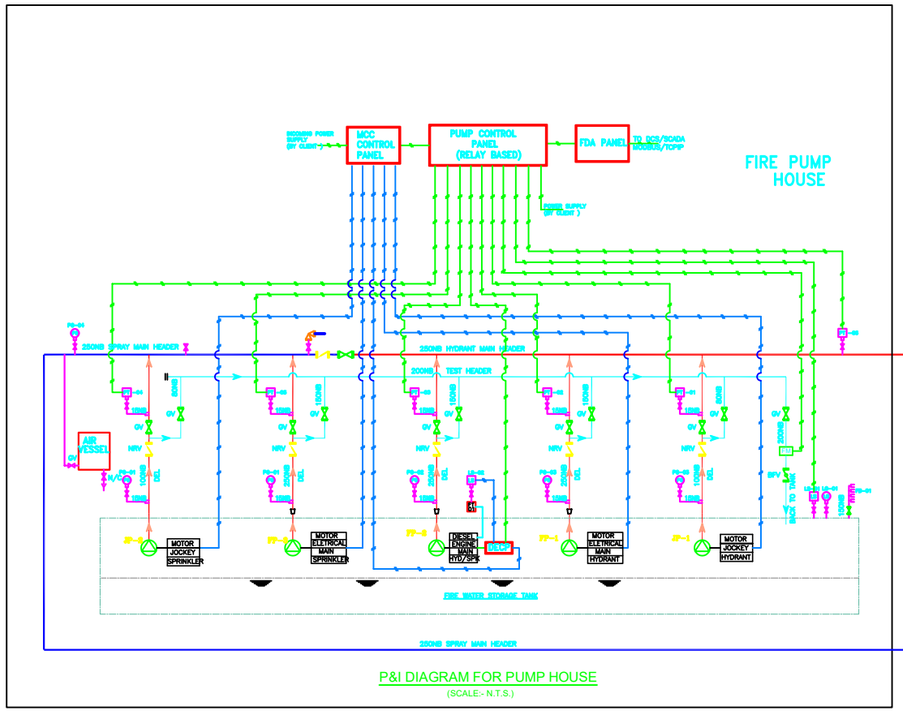
P&ID of Fire Fighting System

DWG NO.:

DWG TITLE:

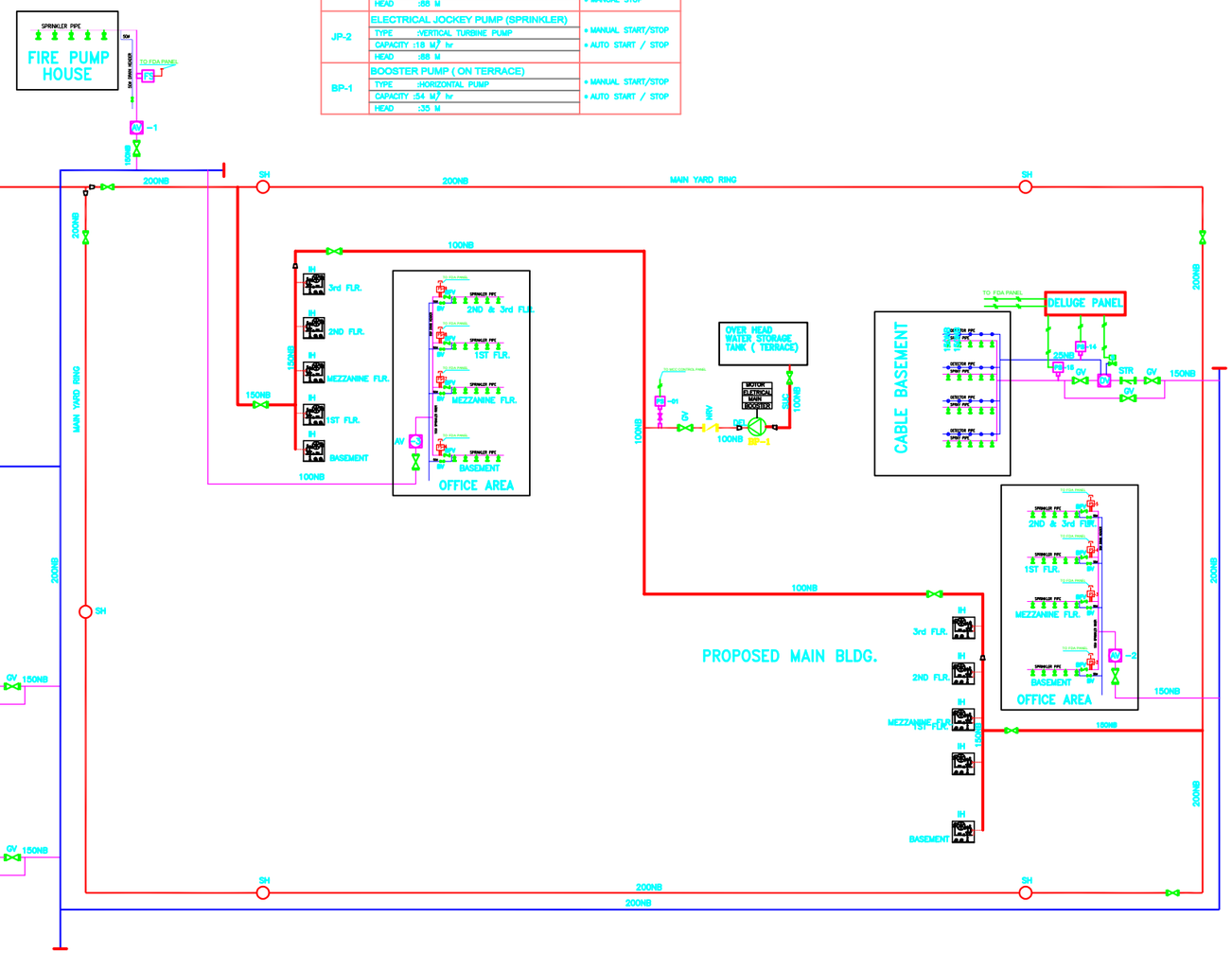
EQUIPMENTS DATA :

TAG. NO.		
FP-1	MAIN ELECTRICAL PUMP (HYDRANT) TYPE :VERTICAL TURBINE PUMP CAPACITY :273 M³/ hr HEAD :88 M	MANUAL START/STOP * AUTO START/ * MANUAL STOP
FP-2	DIESEL ENGINE DRIVEN PUMP (HYDRANT / SPRAY) TYPE :VERTICAL TURBINE PUMP CAPACITY :273 M³/ hr HEAD :88 M	MANUAL START/STOP AUTO START/ * * MANUAL STOP
JP-1	ELECTRICAL JOCKEY PUMP(HYDRANT) TYPE :VERTICAL TURBINE PUMP CAPACITY :18 M³/ hr HEAD :88 M	* MANUAL START/STOP * AUTO START / STOP
FP-3	MAIN ELECTRICAL PUMP (SPRINKLER) TYPE :VERTICAL TURBINE PUMP CAPACITY :410 M³/ hr HEAD :88 M	MANUAL START/STOP * AUTO START/ * MANUAL STOP
JP-2	ELECTRICAL JOCKEY PUMP (SPRINKLER) TYPE :VERTICAL TURBINE PUMP CAPACITY :18 M³/ hr HEAD :88 M	* MANUAL START/STOP * AUTO START / STOP
BP-1	BOOSTER PUMP (ON TERRACE) TYPE :HORIZONTAL PUMP CAPACITY :54 M³/ hr HEAD :35 M	* MANUAL START/STOP * AUTO START / STOP



P&I DIAGRAM FOR PUMP HOUSE

(SCALE:- N.T.S.)



LEGEND :-

S.No.	SYMBOL	DESCRIPTION
1.	FP-1	ELECTRICAL MAIN PUMP (HYDRANT)
2.	FP-2	DIESEL ENGINE DRIVEN MAIN PUMP (HYDRANT & SPRINKLER)
3.	JP-1	JOCKEY PUMP (HYDRANT)
4.	FP-3	ELECTRICAL MAIN PUMP (SPRAY/SPRINKLER)
5.	JP-2	JOCKEY PUMP (SPRAY/SPRINKLER)
6.		DELIVERY LINE (HYDRANT MAIN)
7.		TEST LINE
8.		DELIVERY LINE (SPRAY HEADER)
9.		SPRAY /SPRINKLER LINE
10.		DETECTOR LINE
11.		DRAIN LINE
12.		SPRAY NOZZLE / SPRINKLER
13.		DETECTOR
14.		NON RETURN VALVE(BALL TYPE)
15.		ISOLATION VALVE (GV)
16.	PS	PRESSURE SWITCH
17.	PG	PRESSURE GAUGE
18.		CABLE
19.		CABLE
20.		CONCENTRIC REDUCER (CON)
21.	PG	PRESSURE GAUGE
22.	PS	PRESSURE SWITCH
23.	PT	PRESSURE TRANSMITTER
24.	LS	LEVEL SWITCH
25.	LG	LEVEL GAUGE
26.	FS	FLOW SWITCH
27.	AV	ALARM VALVE
28.	DV	DELUGE VALVE
29.		PRESSURE RELIEF VALVE
30.		FOUR WAY FIRE BRIGADE INLET

TENDER PURPOSE

SCOPE AS PER SPECIFICATION

DEPT	CLEARED SIGNATURE	DATE
CIVIL		
ELEC.		
I&C		
MECH.		
P.&I.		
AUTOM.		

REV	REVISIONS	DRN	CLEARED CIVIL	ELEC	I&C	MECH	P&I	AUTOM	APPD	DATE

REV	REVISIONS	DRN	CLEARED CIVIL	ELEC	I&C	MECH	P&I	AUTOM	APPD	DATE

Project: 110 kV BADALAPUR GIS Project

TITLE: COMBINE P&ID FOR FIRE PROTECTION SYSTEM

TATA POWER

THE TATA POWER COMPANY LIMITED

SCALE : NTS	APPROVED:	DATE: (RO ISSUE) 31/7/2025
DRAWN : RAMAN		DATE: (CURRENT REV.) 31/7/2025
CHECKED :		
REVIEWED:	DWG. NO.: TE00578-00-V001-M-SP-001	REV.: R0

FILE NAME : \\Mcnt\corporate engineering\01Proj Engg\02Engg ISO\DOCUMENTS\FORMS\Inhouse Dwgs-- (A0 to A4)

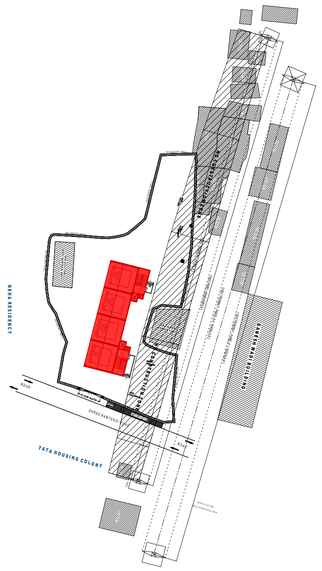
FORM NO. ENG-FM-37-R1

A1

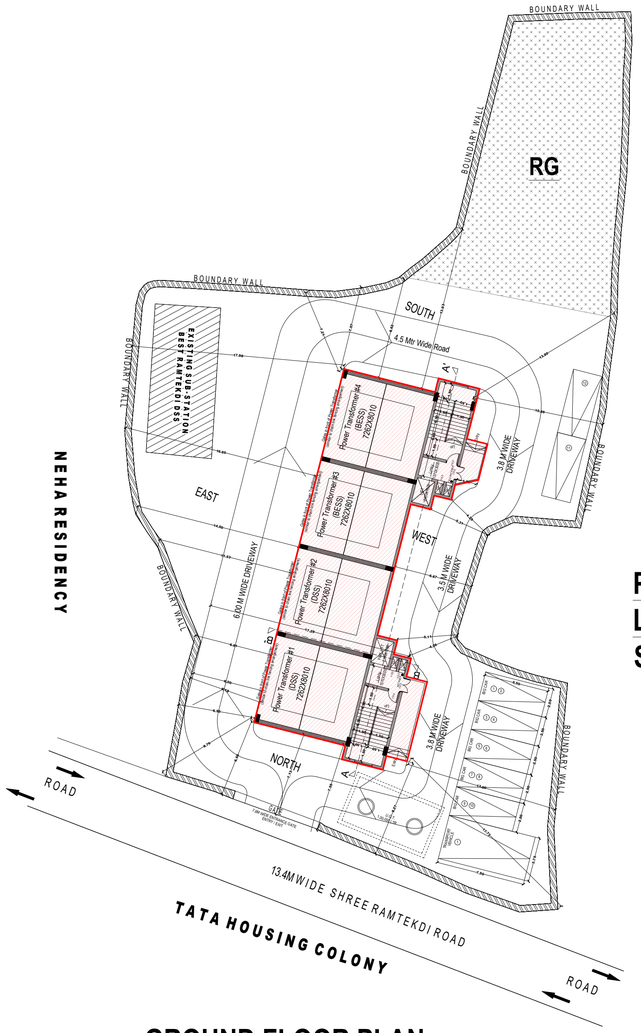
Section D

Annexure 2

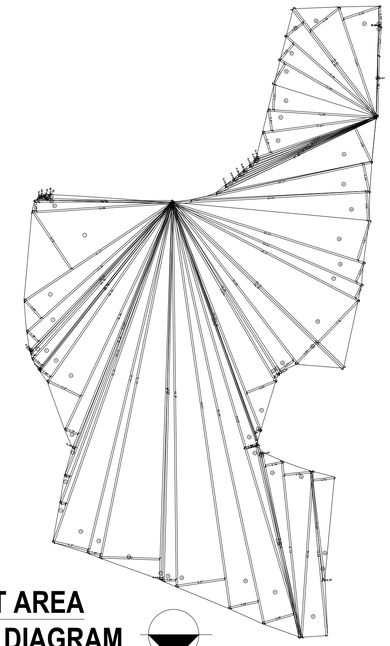
Plot Plan of PAREL RSS



LOCATION PLAN
SCALE 1:4000



GROUND FLOOR PLAN
SCALE 1:100

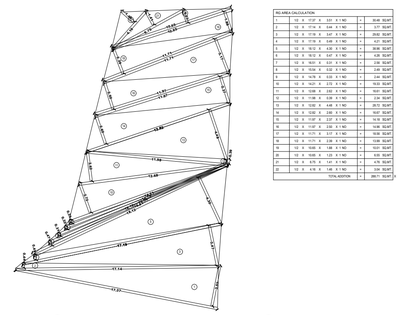


PLOT AREA LINE DIAGRAM
SCALE 1:100

BUILT UP AREA CALCULATION

TYPICAL FLOOR

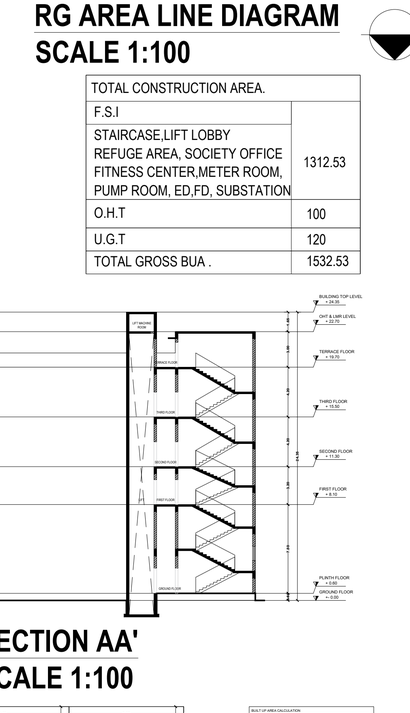
1	1.0	X	21.37	X	8.39	X 1 NO	= 89.65 SQMT
2	1.0	X	23.42	X	3.55	X 1 NO	= 83.13 SQMT
3	1.0	X	24.73	X	1.55	X 1 NO	= 23.83 SQMT
4	1.0	X	24.91	X	0.28	X 1 NO	= 3.48 SQMT
5	1.0	X	25.26	X	0.59	X 1 NO	= 7.46 SQMT
6	1.0	X	25.74	X	1.44	X 1 NO	= 18.53 SQMT
7	1.0	X	25.79	X	0.13	X 1 NO	= 1.69 SQMT
8	1.0	X	26.32	X	1.55	X 1 NO	= 20.53 SQMT
9	1.0	X	30.30	X	4.31	X 1 NO	= 68.21 SQMT
10	1.0	X	31.95	X	1.70	X 1 NO	= 27.16 SQMT
11	1.0	X	35.44	X	0.24	X 1 NO	= 8.52 SQMT
12	1.0	X	36.70	X	0.61	X 1 NO	= 11.80 SQMT
13	1.0	X	43.41	X	0.74	X 1 NO	= 16.00 SQMT
14	1.0	X	43.47	X	4.37	X 1 NO	= 94.88 SQMT
15	1.0	X	43.74	X	1.60	X 1 NO	= 34.89 SQMT
16	1.0	X	45.46	X	7.23	X 1 NO	= 164.34 SQMT
17	1.0	X	45.67	X	0.41	X 1 NO	= 9.38 SQMT
18	1.0	X	46.35	X	1.82	X 1 NO	= 37.34 SQMT
19	1.0	X	49.47	X	3.67	X 1 NO	= 147.67 SQMT
20	1.0	X	52.00	X	3.65	X 1 NO	= 93.60 SQMT
21	1.0	X	54.58	X	3.65	X 1 NO	= 106.08 SQMT
22	1.0	X	23.66	X	1.54	X 1 NO	= 16.24 SQMT
23	1.0	X	31.06	X	1.54	X 1 NO	= 23.93 SQMT
24	1.0	X	23.66	X	0.44	X 1 NO	= 5.19 SQMT
25	1.0	X	22.79	X	0.19	X 1 NO	= 24.84 SQMT
26	1.0	X	21.33	X	3.35	X 1 NO	= 35.73 SQMT
27	1.0	X	20.06	X	0.24	X 1 NO	= 22.50 SQMT
28	1.0	X	19.89	X	0.32	X 1 NO	= 3.18 SQMT
29	1.0	X	13.05	X	2.63	X 1 NO	= 17.16 SQMT
30	1.0	X	30.44	X	0.79	X 1 NO	= 11.87 SQMT
31	1.0	X	29.39	X	3.85	X 1 NO	= 56.56 SQMT
32	1.0	X	24.66	X	0.72	X 1 NO	= 8.90 SQMT
33	1.0	X	24.29	X	0.31	X 1 NO	= 3.76 SQMT
34	1.0	X	24.66	X	3.03	X 1 NO	= 28.03 SQMT
35	1.0	X	28.79	X	3.65	X 1 NO	= 51.80 SQMT
36	1.0	X	28.79	X	7.19	X 1 NO	= 103.52 SQMT
37	1.0	X	25.37	X	1.54	X 1 NO	= 23.34 SQMT
38	1.0	X	24.91	X	2.03	X 1 NO	= 31.51 SQMT
39	1.0	X	24.21	X	4.87	X 1 NO	= 60.16 SQMT
40	1.0	X	23.91	X	5.58	X 1 NO	= 42.56 SQMT
41	1.0	X	22.01	X	3.44	X 1 NO	= 36.37 SQMT
42	1.0	X	21.34	X	4.65	X 1 NO	= 49.62 SQMT
43	1.0	X	15.66	X	0.27	X 1 NO	= 2.12 SQMT
44	1.0	X	16.40	X	0.32	X 1 NO	= 2.62 SQMT
45	1.0	X	17.35	X	0.33	X 1 NO	= 2.86 SQMT
46	1.0	X	18.09	X	0.23	X 1 NO	= 2.26 SQMT
47	1.0	X	18.93	X	0.26	X 1 NO	= 2.46 SQMT
48	1.0	X	20.05	X	0.24	X 1 NO	= 2.41 SQMT
49	1.0	X	21.34	X	0.32	X 1 NO	= 3.41 SQMT
50	1.0	X	15.25	X	2.64	X 1 NO	= 20.13 SQMT
51	1.0	X	13.61	X	2.61	X 1 NO	= 18.22 SQMT
52	1.0	X	13.06	X	3.63	X 1 NO	= 19.79 SQMT
53	1.0	X	13.39	X	2.82	X 1 NO	= 18.89 SQMT
54	1.0	X	14.46	X	2.62	X 1 NO	= 18.94 SQMT
55	1.0	X	16.40	X	2.77	X 1 NO	= 22.71 SQMT
56	1.0	X	16.40	X	4.56	X 1 NO	= 37.39 SQMT
57	1.0	X	13.92	X	4.63	X 1 NO	= 31.53 SQMT
58	1.0	X	3.47	X	0.16	X 1 NO	= 0.28 SQMT
59	1.0	X	2.02	X	0.19	X 1 NO	= 0.20 SQMT
60	1.0	X	7.26	X	0.07	X 1 NO	= 0.25 SQMT
61	1.0	X	16.88	X	1.09	X 1 NO	= 9.20 SQMT
62	1.0	X	16.56	X	0.49	X 1 NO	= 4.06 SQMT
63	1.0	X	16.19	X	0.48	X 1 NO	= 3.89 SQMT
64	1.0	X	0.65	X	0.39	X 1 NO	= 0.13 SQMT
65	1.0	X	1.95	X	0.27	X 1 NO	= 0.14 SQMT
66	1.0	X	16.19	X	0.25	X 1 NO	= 2.02 SQMT
						TOTAL ADDITION	= 1848.62 SQMT



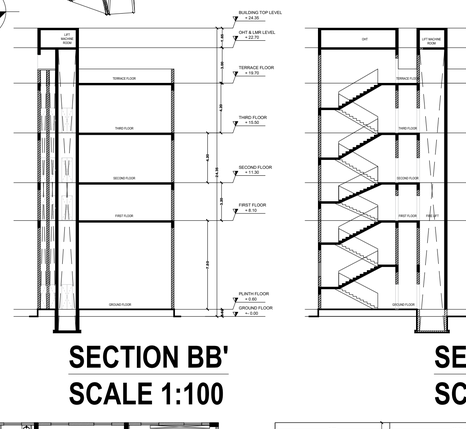
RG AREA LINE DIAGRAM
SCALE 1:100

RG AREA CALCULATION

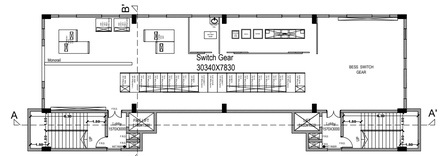
1	1.0	X	17.07	X	3.01	X 1 NO	= 51.40 SQMT
2	1.0	X	17.14	X	3.68	X 1 NO	= 63.11 SQMT
3	1.0	X	17.15	X	3.47	X 1 NO	= 59.62 SQMT
4	1.0	X	17.15	X	3.68	X 1 NO	= 63.11 SQMT
5	1.0	X	18.12	X	4.35	X 1 NO	= 39.66 SQMT
6	1.0	X	18.12	X	5.07	X 1 NO	= 4.56 SQMT
7	1.0	X	18.01	X	3.01	X 1 NO	= 2.66 SQMT
8	1.0	X	18.04	X	3.03	X 1 NO	= 2.66 SQMT
9	1.0	X	18.76	X	3.03	X 1 NO	= 2.64 SQMT
10	1.0	X	9.01	X	3.03	X 1 NO	= 19.53 SQMT
11	1.0	X	10.66	X	2.93	X 1 NO	= 19.61 SQMT
12	1.0	X	11.96	X	3.08	X 1 NO	= 2.54 SQMT
13	1.0	X	13.50	X	4.48	X 1 NO	= 29.72 SQMT
14	1.0	X	13.50	X	4.68	X 1 NO	= 19.67 SQMT
15	1.0	X	11.07	X	2.07	X 1 NO	= 14.19 SQMT
16	1.0	X	11.07	X	1.55	X 1 NO	= 10.64 SQMT
17	1.0	X	11.71	X	2.17	X 1 NO	= 19.66 SQMT
18	1.0	X	11.71	X	1.55	X 1 NO	= 13.54 SQMT
19	1.0	X	11.66	X	1.98	X 1 NO	= 19.01 SQMT
20	1.0	X	11.66	X	1.55	X 1 NO	= 14.89 SQMT
21	1.0	X	4.75	X	1.41	X 1 NO	= 4.76 SQMT
22	1.0	X	4.75	X	1.46	X 1 NO	= 3.24 SQMT
						TOTAL ADDITION	= 399.71 SQMT



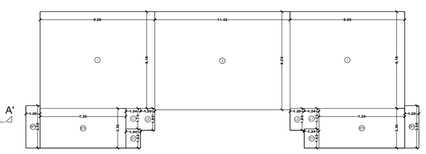
SECTION BB'
SCALE 1:100



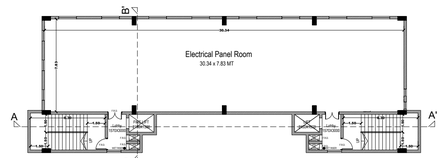
SECTION AA'
SCALE 1:100



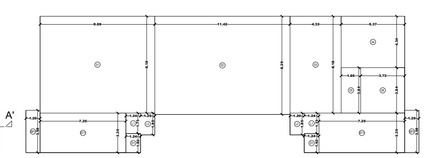
SECOND FLOOR PLAN
SCALE 1:100



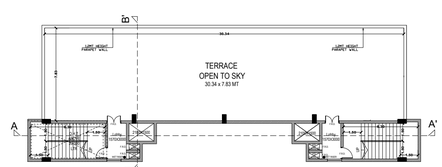
SECOND FLOOR AREA LINE DIAGRAM
SCALE 1:100



THIRD FLOOR PLAN
SCALE 1:100



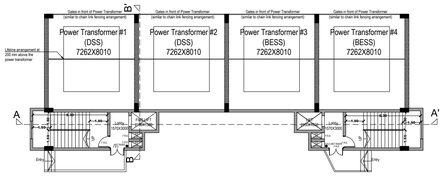
THIRD FLOOR AREA LINE DIAGRAM
SCALE 1:100



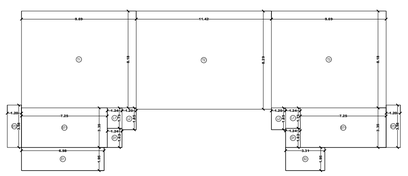
TERRACE FLOOR PLAN
SCALE 1:100

CONSTRUCTION AREA CALCULATION

FLOOR	TRANSFORMER	STAIRCASE	LIFT	DUCT	TOTAL BUA (SQ.MT)
GRD. FLR.	273.25	57.17	8.73	4.02	343.17
1ST. FLR.	253.20	57.17	8.73	4.02	323.12
2ND. FLR.	253.20	57.17	8.73	4.02	323.12
3RD. FLR.	253.20	57.17	8.73	4.02	323.12
TOTAL	1,032.85	228.68	34.92	16.08	1312.53



GROUND FLOOR PLAN
SCALE 1:100



GROUND FLOOR AREA LINE DIAGRAM
SCALE 1:100

BUILT UP AREA CALCULATION

LIFT

L1	1.0	X	1.73	X	2.5425	=	4.39 SQMT
L2	1.0	X	1.66	X	2.5425	=	4.22 SQMT
					TOTAL ADDITION	=	8.61 SQMT

BUILT UP AREA CALCULATION

STAIRCASE

ST1	7.25	X	3.08	X	2.5425	=	48.58 SQMT
ST2	1.25	X	3.08	X	2.5425	=	9.79 SQMT
					TOTAL ADDITION	=	58.37 SQMT

BUILT UP AREA CALCULATION

ENTRANCE

E1	5.08	X	1.90	X	1.140	=	10.61 SQMT
E2	5.01	X	1.90	X	1.140	=	10.45 SQMT
					TOTAL ADDITION	=	20.06 SQMT

BUILT UP AREA CALCULATION

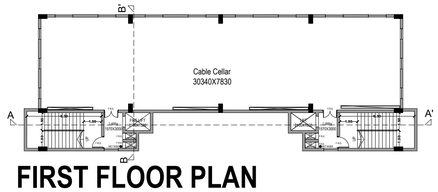
DUCT

D1	1.04	X	1.92	X	2.5425	=	4.02 SQMT
					TOTAL ADDITION	=	4.02 SQMT

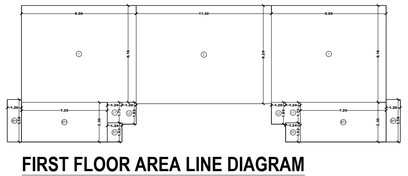
BUILT UP AREA CALCULATION

TRANSFORMER

T1	5.68	X	8.16	X	1.140	=	79.05 SQMT
T2	11.42	X	8.29	X	1.140	=	94.67 SQMT
T3	5.68	X	8.16	X	1.140	=	79.05 SQMT
					TOTAL ADDITION	=	252.76 SQMT
					TOTAL ADDITION A-B-C-D-E	=	343.17 SQMT



FIRST FLOOR PLAN
SCALE 1:100



FIRST FLOOR AREA LINE DIAGRAM
SCALE 1:100

BUILT UP AREA CALCULATION

LIFT

L1	1.04	X	1.73	X	2.5425	=	4.39 SQMT
L2	1.01	X	1.66	X	2.5425	=	4.73 SQMT
					TOTAL ADDITION	=	9.13 SQMT

BUILT UP AREA CALCULATION

STAIRCASE

ST1	7.25	X	3.08	X	2.5425	=	48.58 SQMT
ST2	1.25	X	3.08	X	2.5425	=	9.79 SQMT
					TOTAL ADDITION	=	58.37 SQMT

BUILT UP AREA CALCULATION

DUCT

D1	1.04	X	1.92	X	2.5425	=	4.02 SQMT
					TOTAL ADDITION	=	4.02 SQMT

BUILT UP AREA CALCULATION

BUA

1	5.68	X	8.16	X	1.140	=	158.03 SQMT
2	11.42	X	8.29	X	1.140	=	94.67 SQMT
					TOTAL ADDITION	=	252.69 SQMT
					TOTAL ADDITION A-B-C-D	=	323.12 SQMT

FIRST FLOOR PLAN
SCALE 1:100

BUILT UP AREA CALCULATION

LIFT

L1	1.04	X	1.73	X	2.5425	=	4.39 SQMT
L2	1.01	X	1.66	X	2.5425	=	4.73 SQMT
					TOTAL ADDITION	=	9.13 SQMT

BUILT UP AREA CALCULATION

STAIRCASE

ST1	7.25	X	3.08	X	2.5425	=	48.58 SQMT
ST2	1.25	X	3.08	X	2.5425	=	9.79 SQMT
					TOTAL ADDITION	=	58.37 SQMT

BUILT UP AREA CALCULATION

DUCT

D1	1.04	X	1.92	X	2.5425	=	4.02 SQMT
					TOTAL ADDITION	=	4.02 SQMT

BUILT UP AREA CALCULATION

BUA

1	5.68	X	8.16	X	1.140	=	158.03 SQMT
2	11.42	X	8.29	X	1.140	=	94.67 SQMT
					TOTAL ADDITION	=	252.69 SQMT
					TOTAL ADDITION A-B-C-D	=	323.12 SQMT



SECOND FLOOR AREA LINE DIAGRAM
SCALE 1:100

BUILT UP AREA CALCULATION

LIFT

L1	1.04	X	1.73	X	2.5425	=	4.39 SQMT
L2	1.01	X	1.66	X	2.5425	=	4.73 SQMT
					TOTAL ADDITION	=	9.13 SQMT

BUILT UP AREA CALCULATION

STAIRCASE

ST1	7.25	X	3.08	X	2.5425	=	48.58 SQMT
ST2	1.25	X	3.08	X	2.5425	=	9.79 SQMT
					TOTAL ADDITION	=	58.37 SQMT

BUILT UP AREA CALCULATION

DUCT

D1	1.04	X	1.92	X	2.5425	=	4.02 SQMT
					TOTAL ADDITION	=	4.02 SQMT

BUILT UP AREA CALCULATION

ELECTRICAL PANEL ROOM

E1	5.68	X	8.16	X	1.140	=	79.05 SQMT
E2	11.42	X	8.29	X	1.140	=	94.67 SQMT
E3	1.25	X	3.08	X	1.140	=	4.39 SQMT
E4	5.67	X	4.04	X	1.140	=	23.31 SQMT
E5	1.25	X	3.08	X	1.140	=	4.39 SQMT
E6	3.72	X	3.08	X	1.140	=	14.26 SQMT
					TOTAL ADDITION	=	255.06 SQMT
					TOTAL ADDITION A-B-C-D-E	=	322.12 SQMT

THIRD FLOOR AREA LINE DIAGRAM
SCALE 1:100

BUILT UP AREA CALCULATION

LIFT

L1	1.04	X	1.73	X	2.5425	=	4.39 SQMT
L2	1.01	X	1.66	X	2.5425	=	4.73 SQMT
					TOTAL ADDITION	=	9.13 SQMT

BUILT UP AREA CALCULATION

STAIRCASE

ST1	7.25	X	3.08	X	2.5425	=	48.58 SQMT
ST2	1.25	X	3.08	X	2.5425	=	9.79 SQMT
					TOTAL ADDITION	=	58.37 SQMT

BUILT UP AREA CALCULATION

DUCT

D1	1.04	X	1.92	X	2.5425	=	4.02 SQMT
					TOTAL ADDITION	=	4.02 SQMT

BUILT UP AREA CALCULATION

BUA

1	5.68	X	8.16	X	1.140	=	158.03 SQMT
2	11.42	X	8.29	X	1.140	=	94.67 SQMT
					TOTAL ADDITION	=	252.69 SQMT
					TOTAL ADDITION A-B-C-D	=	323.12 SQMT

1/1

PLANS FOR APPROVAL

KISHORE DNYANDEO GHADIGAO NKAR — Digitally signed by KISHORE DNYANDEO GHADIGAONKAR Date: 2025.10.03 12:47:56 +05'30'

DFO | Dy.CFO

AS PER FILE NO:-P-26694/2025/(3/159)/F/South/PAREL-SEWERI.

PROFORMA -A

I.	AREA STATEMENT	SQ.MT
1.	AREA OF PLOT	1908.62
a)	AREA OF RESERVATION ON PLOT	NIL
b)	AREA OF ROAD SETBACK	NIL
c)	AREA OF DP ROAD	NIL
2.	DEDUCTIONS FOR :	
A)	FOR RESERVATION/ROAD AREA	
a)	Road setback area to be handed over (100%) (Regulation No16)	0.00
b)	Proposed DP road to be handed over (100%) (Regulation No16)	0.00
c)	(i)Reservation area to be handed over (100%) (Regulation No17)	0.00
	(ii)Reservation area to be handed over as per AR (Regulation No17)	0.00
B)	For Amenity Area	N.A.
a)	Area of amenity plot to be handed over as per DCR 14(A)	N.A.
b)	Area of amenity plot to be handed over as per DCR 14(B)	N.A.
c)	Area of amenity plot to be handed over as per DCR 35 (abeyance)	N.A.
C	Deductions for existing BUA to be retained if any/land component of existing BUA as per Regulation under which the development was allowed	NA
3.	Total deductions [2(A)+2(B)+2(C) as and when applicable	0.00
4.	Balance area of plot (1minus3)	1908.62
5.	Plot area under development after areas to be handed over to MCGM/ Appropriate Authority as per Sr.No.4 above	1908.62
6.	Zonal (basic) FSI (0.50 or 0.75 or 1or 1.33) As Per Regn.33(3)	1.33
7.	Built up Area as per zonal (basic) FSI (5*6) (In case of mill land Permissible BUA kept in abeyance	2,538.46
8.	Built up equal to area of land handed over as per Regulation 30(A)	NIL
i.	As per 2(A) and 2(B) except 2(A)(c) (ii) above with in cap of "Admissible TDR" as column 6 of Table-12 on remaining / balance plot)	NIL
ii.	In case of 2(A)(c) (ii) permissible over and above permissible BUA on remaining/balance plot	NIL
9.	PERMISSIBLE FUNGIBLE 35% ON TOTAL BUILT UP AREA	NIL
10.	Built up area due to "Additional FSI on Payment of Premium" as per Table No. of Regulation No. 30(A) on remaining/ balance plot.	N.A.
11.	Built up area due to admissible "TDR" as per Table No 12 of Regulation No. 30(A)and 32 on remaining / balance plot.	N.A.
12.	Permissible Built-up Area (as the case may be with/without BUA as per 2(c))	2,538.46
13.	Proposed BUA (as the case may be with/without BUA as per 2(c))	1312.53
14.	TDR generated if any as per regulation 30(A) and 32.	N.A.
15.	Fungible Compensatory Area as per Regulation No. 31(3)	
a)	i) Permissible Fungible Compensatory area for Rehab component without charging premium	NA
	ii) Fungible Compensatory area availed for Rehab component without charging premium	NA
b)	i) Permissible Fungible Compensatory area by charging premium. ii) Fungible Compensatory area availed on payment of premium	
		NIL
16.	Total Built-up Area proposed including Fungible Compensatory Area [13+15(a)(ii) +15(b)(ii)]	1312.53
17.	FSI consumed on Net Plot [13/4]	NIL
(II)	Other Requirements	
(A)	Reservation/Designation	
a)	Name of Reservation	
b)	Area of Reservation affecting the plot	NIL
c)	Area of Reservation land to be handed/handed over as per Regulation No.17	NIL
d)	Built up area of Amenity to be handed over as per Regulation No.17	NIL
e)	Area/Built up Area of Designation	
(B)	Plot area/Built up Amenity to be Handed Over as per Regulation No.	NA
(i)	14(A)	NA
(ii)	14(B)	NA
(iii)	15	NA
(C)	Requirement of Recreational Open Space in Layout/Plot as per Regulation 27, Required=286.29	288.71
(D)	Tenement Statement :	
(i)	Proposed built up area (13 above)	NIL
(ii)	Less deduction of Non-residential area (Shop etc.)	0.00
(iii)	Area available for tenements ((i) minus (ii).)	NIL
(iv)	Tenements permissible (Density of tenements/hectare)	
(v)	Total number of Tenements proposed on the plot	00
(E)	Parking Statement	
(i)	Parking required by Regulations for. -	
	Car Scooter/Motor cycle	09
	Outsiders (visitors)	02
(ii)	Covered garage permissible	NA
(iii)	Covered garages proposed Car Scooter/ Motor cycle Outsider (Visitors)	NA
(iv)	Total parking provided	11
(F)	Transport Vehicles Parking	
(i)	Spaces for transport vehicles parking required by Regulations 44(5) of DCPR 2034	1
(ii)	Total No. of transport vehicles parking spaces provided	1

PROFORMA –'B'

CONTENT OF SHEET

LOCATION PLAN, GROUND FLOOR PLAN, ground floor area line diagram , first floor plan, first floor area line diagram, built up area table, construction table

DESCRIPTION OF PROPOSAL & PROPERTY

PROPOSED DEVELOPMENT OF DSS ON PLOT BEARING NO. CS.NO-3/159 OF PAREL SEWRI DIVISION IN F/S WARD , PAREL TANK ROAD, MUMBAI-400012.

NAME OF OWNER	SIGNATURE
THE TATA POWER COMPANY LIMITED CORPORATE GENERAL TROMBAY POWER STATION MAHUL ROAD CHEMBUR MUMBAI 400074	PARAG ACHYUT RAILKAR — Digitally signed by PARAG ACHYUT RAILKAR Date: 2025.09.30 09:56:51 +05'30'

NAME, ADDRESS OF ARCHITECT	SIGNATURE
G. M. ARCH PVT. LTD. ARCHITECTURAL CONSULTANTS G M ARCH PVT LTD.	PURUSHOTTAM TUKARAM GOVIND REDEKAR — Digitally signed by PURUSHOTTAM TUKARAM GOVIND REDEKAR Date: 2025.09.30 09:56:51 +05'30'

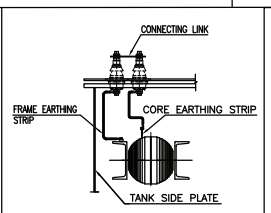
Office Add :-
K. K. CHAMBERS,
P. T. ROAD, FORT,
MUMBAI-400 001.
E-mail I.D. : gmarch.pgr@gmail.com
Tel. : 022-26400512

CORP.OFFICE ADD :-
3, MERCURY CHS, OPP HALL MARK BUSINESS PLAZA, BANDRA (E), MUMBAI-400051.
CELL : +91 9820032623/+91 9920032623
E-mail: gmarch.pgr@gmail.com gmarch.mumbai@gmail.com gmarch@rediffmail.com info@gmarch.in
website : www.gmarch.in

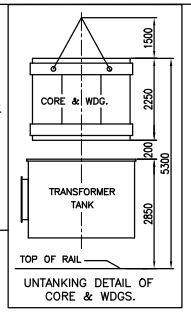
NORTH	DATE	24.09.2025	DRAWN BY	ROSHAN
	SCALE : 1:100		CHECKED BY	AR.SAUDNYA.M
	CERTIFICATE OF AREA		APPROVED BY	P.G.REDEKAR

CERTIFIED THAT THE PLOT UNDER REFERENCE WAS GOT SURVEYED BY ME ON AND THE DIMENSIONS OF SIDES ETC. OF PLOT STATED ON PLAN ARE AS MEASURED ON SITE AND THE AREA SO WORKED OUT TALLIES WITH THE AREA STATED IN DOCUMENT OF OWNERSHIP/T.P.RECORD.

THIS DRAWING/DOCUMENT IS THE PROPERTY OF M/S. TELAWNE POWER EQUIPMENT PVT.LTD.SHOULD NOT BE COPIED OR REPRODUCED IN ANY FORM WITHOUT WRITTEN PERMISSION OF TELAWNE POWER EQUIPMENT PVT.LTD.NAVI MUMBAI



CORE FRAME EARTHING DETAILS



UNTANKING DETAIL OF CORE & WDGS.

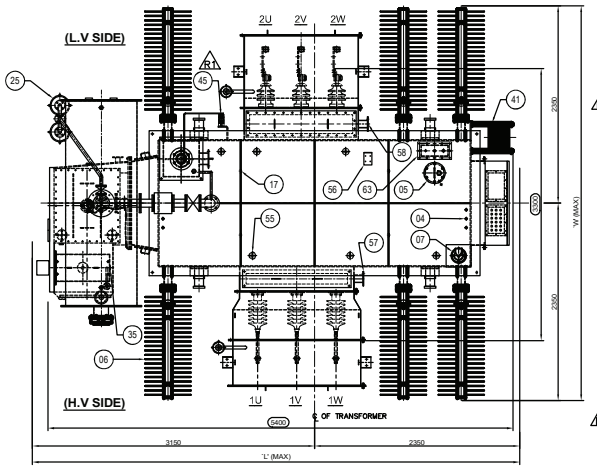
MIN. TK. FOR TRANSFORMER	
TANK SIDE WALL (mm)	10
TANK TOP COVER (mm)	12
TANK BOTTOM PLATE (mm)	12
CONSERVATOR (mm)	6
CONSERVATOR SIZE (mm) Ø800 x 1820 LG.	

MIN. CLEARANCE AS PER CBIP		
	BETWEEN PH. TO PH.	BETWEEN PH. TO EARTH.
HV	350	220
LV	130	90
N	130	90

OVERALL DIMENSIONS (MAX)				
KVA	V/R	L	W	H
20000	33/11	5500	4700	5300

DESCRIPTION	WT IN Kgs
CORE & WINDING	20890
TANK & FITTINGS	8,420
WEIGHT OF OIL	9,690
VOLUME OF OIL (LTR)	10,200
TOTAL WEIGHT	39000

1. The ladder shall have door with locking provision
2. The ladder handles shall be at least 3 feet above the tank
3. Equalizing earth strip to be provided for each gasket.
4. Min. six number of equalizing strip to be provided between main tank & top cover

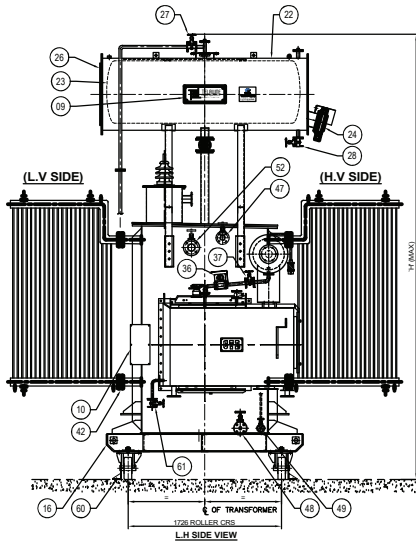


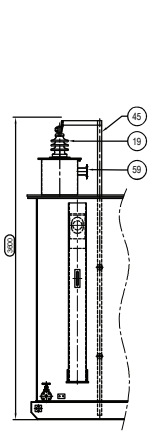
BILL OF MATERIAL

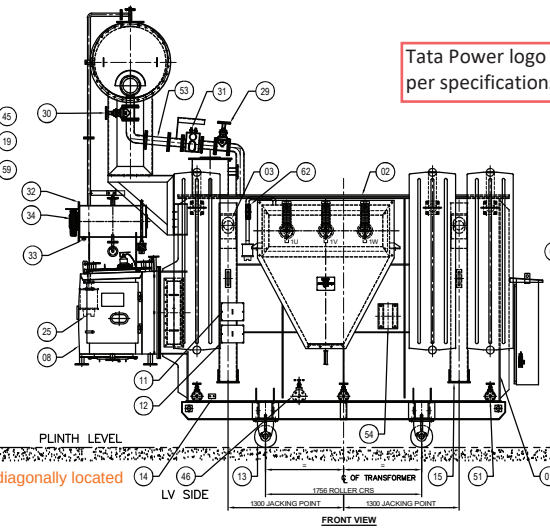
ITEM NO.	DESCRIPTION	QTY.
41	LADDER (DETACHABLE TYPE)	1
42	ISOLATING VALVE FOR RADIATOR (TOP & BOTTOM)	6+6
43	H.V CABLE BOX SUPPORT	2
44	L.V CABLE BOX SUPPORT	2
45	L.V NEUTRAL EARTHING FLAT (75x10mm THK.) WITH INSULATOR SUPPORT 11kV (2NOS) (SEE DETAIL)	1
46	DRAIN VALVE (50NB) WITH PAD LOCKING	1
47	TOP FILTER VALVE (50NB) WITH PAD LOCKING	1
48	BOTTOM FILTER VALVE(50NB) WITH PAD LOCKING	1
49	TOP SAMPLING VALVE(15NB) WITH PAD LOCKING	1
50	BOTTOM SAMPLING VALVE(15NB) WITH PAD LOCKING	1
51	VALVE FOR NITROGEN INJECTION (25NB) WITH PAD LOCKING (H.V & LV SIDE) (FOR PROVISION ONLY)	3+3
52	DRAIN VALVE (80NB) WITH PAD LOCKING FOR FOR PNT FIRE SYSTEM. (FOR PROVISON ONLY)	1
53	DISTANCE PIECE FOR MOUNTING OF PNRV OF PNT FIRE SYSTEM. (FOR PROVISION ONLY)	1
54	FIXING BRACKET FOR SIGNAL BOX PNT FIRE SYSTEM. (FOR PROVISION ONLY)	1
55	ARC SENSER MTG FLANGE (FOR PROVISION ONLY)	6
56	LHD JUNCTION BOX FIXING BRACKET	1
57	H.V WTI CT TERMINAL BOX	1
58	L.V WTI CT TERMINAL BOX	1
59	NEUTRAL CT TERMINAL BOX	1
60	ANTI EARTH QUAKE CLAMPING ARRANGEMENT.	4
61	OLTC DRAIN VALVE	1
62	TRANSPORT OIL LEVEL GAUGE	1
63	CORE-FRAME EARTHING BUSHING	2
64	SILICA GEL BREATHER FOR HV & LV CABLE BOX 1kg	1+1
65	INSULATOR SUPPORT	2

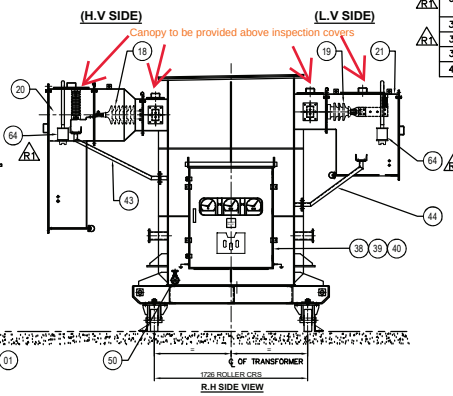
BILL OF MATERIAL

ITEM NO.	DESCRIPTION	QTY.
1	TRANSFORMER TANK	1
2	TRANSFORMER COVER	1
3	LIFTING LUG FOR COMPLETE TRANSFORMER	4
4	THERMOMETER POCKET	4
5	INSPECTION COVER	1
6	RADIATOR WITH AIR RELEASE PLUG, LIFTING LUG & DRAIN PLUG	6
7	PREESURE RELIEF VALVE WITH TRIP CONTACT AND RAIN GUARD	1
8	ON LOAD TAP CHANGER	1
9	MONOGRAM PLATE	1
10	RATING & DIAGRAM PLATE	1
11	VALVE SCHEDULE PLATE	1
12	OIL FILLING INSTRUCTION PLATE	1
13	FLAT ROLLERS (BI-DIRECTIONAL) WITH SKID	4
14	EARTHING TERMINAL	2
15	JACKING PADS	4
16	BASE CAHNNEL WITH HAULING HOLE	1
17	LIFTING HOLES FOR COVER	4
18	H.V BUSHING	3
19	L.V & L.V.N BUSHING	3+1
20	H.V CABLE BOX WITH DISCONNECTING CHAMBER	1
21	L.V CABLE BOX	1
22	CONS'R WITH OIL FILLING PIPE & FLANGE	1
23	AIR CELL BAG OF CONSERVATOR	1
24	MAGNETIC OIL LEVEL GAUGE WITH RAIN HOOD	1
25	SILICA GEL BREATHER FOR MAIN & OLTC CONS'R	2+1
26	PRISMATIC OIL LEVEL GAUGE (MAIN CONS'R)	2
27	VALVE FOR BREATHER PIPE	1
28	CONSERVATOR DRAIN VALVE WITH PAD LOCKING	1
29	SHUT-OFF VALVE BETWEEN BUCHHOL'Z RELAY TO TANK	1
30	SHUT-OFF VALVE BETWEEN BUCHHOL'Z RELAY TO CONSERVATOR	1
31	BUCHHOLZ RELAY WITH ALARM & TRIP CONTACTS WITH RAIN GUARD	1
32	OLTC CONSERVATOR	1
33	OLTC CONSERVATOR DRAIN PLUG	1
34	MAGNETIC OIL LEVEL GAUGE WITH RAIN HOOD	1
35	PRISMATIC OIL LEVEL GAUGE (OLTC CONS'R)	1
36	OIL SURGE RELAY FOR OLTC WITH TRIP CONTACT WITH GUARD	1
37	SHUT-OFF VALVE BETWEEN OIL SURGE RELAY TO CONS'R	1
38	MARSHALLING BOX WITH GUARD	1
39	OIL TEMPERATURE INDICATOR	1
40	WINDING TEMPERATURE INDICATOR	2









Tata Power logo plate to be provided as per specifications clause no 6.6

1kg breathers to be provided on Terminal box

earthing pad shall be diagonally located

NOTES-

1) ALL DIMENSIONS ARE IN mm.
2) SHAPE & POSITION OF FITTINGS SHOWN ARE APPROXIMATE & MAY CHANGE AT THE TIME OF MANUFACTUREING.
3) EXACT WEIGHT WILL BE UPDATED AFTER DETAIL ENGINEERING
4) EXTERNAL PAINT : PU, SHADE : RAL 6037 WITH 180 MICRON MINIMUM.
5) TANK SLOPE 20mm ON HV. SIDE
6) CU. FLEXIBLE STRIP SHALL BE PROVIDED AT ALL GASKETED JOINT FOR EARTHING CONTINUITY.
7) TRANSFORMER TOP SURFACE SHALL BE SLOPED.
8) RAIN GUARD TO BE PROVIDED FOR B'RELAY, OSR, MOG, PRV & MARSHALLING BOX.
9) ALL EXTERNAL HARDWARE SHOULD BE USE M12 & ABOVE HOT DIP GALVANISED (60-80 MICRON THK.)AND M10 & BELOW S.S. R1
10) TRANSPORT DIMENSIONS ARE MARKED IN

1. Spares to be provided as per list
2. The nampe plate data and test reports to be made available in a QR code plate the data can be hosted in TPC cloud
3. The Tightning torque chart to be provided for all gascated bolts and terminal bolts

4.Protection cable tray at the top of PTR to be provided for all cables with proper dressing up to marshalling box.
5. The NIDS sensor and cables to be properly dressed on tank

REV	DESCRIPTION	DRN BY	CHD BY	APPD BY	DATE
R2	DRAWING REVISED AS PER CUSTOMER COMMENTS.	SHD	PSP	MMM	28.10.2024
R1	DRAWING REVISED AS PER CUSTOMER COMMENTS.	SHD	MMM	MMM	18.10.2024
R0	INITIAL DRAWING.	SHD	MMM	MMM	07.10.2024

	NAME	SIGN	DATE
DRAWN BY	SHD		07.10.2024
CHKD BY	MMM		07.10.2024
APPD BY	MMM		07.10.2024

RELEASED FOR :-
REFERENCE ☐ MANUFACTURING ☐
APPROVAL ☑ AS BUILT ☐
IF IN DOUBT, PLEASE ASK

CUSTOMER:- THE TATA POWER COMPANY LTD.
EPC/CONTRACTOR:- –
PROJECT:- –
TITLE:- GA DRAWING FOR 20000 kVA 33/11kV POWER TRANSFORMER
ALL DIMENSION ARE IN mm UNLESS OTHERWISE SPECIFIED.
PROJECTION :
SCALE : NTS
DRAWING NO. TPE-D-25-8692
REV:- R2

SALES ORDER NO. 8692

TELAWNE EMPOWERING GENERATIONS
webiste:www.telawne.com
SIZE-A3
SHEET: 1 OF 1

Section D

Annexure 3

Conditional Fire “No Objection Certificate”

BRIHANMUMBAI MUNICIPAL CORPORATION
MUMBAI FIRE BRIGADE

Office of the Dy .Chief Fire Officer(R-II),Wadala Fire Station, Shaikh Mistry Dargah road, C.G.S. Colony, Opp. MHADA Colony, Antop Hill, Wadala, Mumbai-400 037.Telephone No. 24132058 Fax No. 24153027.

==========

Sub: Provisional Fire-safety approval for the proposed development of DSS on plot Bearing C.S.No. 3/159 of Parel Sewri Division in F/S Ward, Parel Tank Road, Mumbai – 400 012.

Ref.: i) Online uploaded by Mr. P.G. Redekar, L.S. (Reg. No. R/148/LS) of M/s. G.M. Arch. Pvt. Ltd.
ii) Online file no.: P-26694/2025/(3/159)/F/South/PAREL-SEWERI-CFO/1/New.

THE TATA POWER COMPANY LIMITED
TATA CORPORATE GENERAL TROMBAY POWER
STATION MAHUL ROAD CHEMBUR
MUMBAI 400074

This is a proposal under 33(7) of DCPR 2034 for the construction of proposed Low-rise Commercial building comprising of Ground for 02 nos. of Power Transformer (DSS) & 02 nos. of Power Transformer (BESS) + 1st floor for cable cellar + 2nd floor for switch gear, battery bank, battery charger with DCDB, RTCC, SCADA, eye wash area, 33 KV ICOG Panel-1, 33 KV ICOG Panel-2, BKR RMU-1, BKR RMU-2, BESS switch gear + 3rd floor for meeting room, 02 nos. of cabins, cubicle, conference room, recreation room, pantry, waiting area, work station having height of the building is **19.70 Mtrs**. from general ground level up to terrace level.

THE FLOOR WISE USERS OF THE BUILDING ARE AS UNDER AS SHOWN ON THE PLAN;

Floors	Proposed floor wise user
Ground floor	02 nos. of Power Transformer (DSS) & 02 nos. of Power Transformer (BESS)
1st floor	cable cellar
2nd floor	Switch gear, battery bank, battery charger with DCDB, RTCC, SCADA, eye wash area, 33 KV ICOG Panel-1, 33 Kv ICOG Panel-2, BKR RMU-1, BKR RMU-2, BESS switch gear
3rd floor	Meeting room, 02 nos. of cabins, cubicle, conference room, recreation room, pantry, waiting area, work station
Terrace floor	OHT, LMR & Terrace open to sky.

THE OPEN SPACES HAS BEEN PROVIDED AS UNDER AS SHOWN ON THE PLAN:-

The Site abuts to 13.40 Mtrs. wide Shree Ramtekdi Road North side, as shown on the uploaded plan.

Side	Open spaces
North	6.66 mtrs to 08.27 Mtrs. + 13.40 Mtrs. wide Shree Ramtekdi Road.
South	7.07 mtrs to 35.50 mtrs.
East	6.55 mtrs to 17.98 mtrs
West	4.26 mtrs to 13.00 mtrs

REFUGE AREA AS SHOWN ON THE PLAN:

As the height of building is 19.70 Mtrs. i.e. below 32.00 Mtrs. terrace floor will be treated as refuge area.

THE DETAILS OF STAIRCASE AS SHOWN ON THE PLAN:

Staircase	Width	Nos. of Staircases
Leading from Ground to terrace floor level.	1.50 Mtrs.	02 Nos.
The proposed main staircase as shown on the plans is enclosed type and is externally located & adequately ventilated to outside air above ground level. & provided with smoke check lobby.		

THE DETAILS OF LIFTS AS SHOWN ON THE PLAN:

Lifts Type	Profile	Nos.
Passenger lift	Ground floor to top floor level	01 No.
Fire lift	Ground floor to top floor level.	01 No.
The lift lobby/common corridor at each floor level is directly ventilated to outside air.		

The proposal has been considered favorably in view of the following facts:

i) The said proposal falls under redevelopment scheme 33(7) of DCPR-2034.
ii) The Site abuts to 13.40 Mtrs. wide Shree Ramtekdi Road North side, as shown on the uploaded plan.
iii) The building is recommended with advanced in-built fire-fighting system such as Wet riser cum Down-comer system, Hydrant System, fire alarm system, automatic smoke detection and sprinkler system, etc.
iv) Automatic smoke detection system is recommended in electric meter room, pump room, lift machine room and wherever false ceiling will be provided at above & below the false ceiling level with response indicator.
v) The fire resistance rating for the main door of every residential flat, electric meter room and the staircase doors on every floor level are as per N.B.C. provisions.
vi) Nitrogen Injection Fire Protection System shall be provided for power transformers of the Receiving station building as per the relevant standards **OR** High velocity Water spray projector (emulsifying) system shall be provided as per the standard laid down by T.A.C. or relevant I.S. specification

Architect/L.S. is requested to scrutinize the plans as per DCPR & get verified the civil work and all other requirements pertaining to civil Engineering side including open spaces, corridors, staircases, amendments, height, & floor occupancy of the building from competent Municipal Authority and if these plans, given open space is not approvable, then this Fire

Safety Requirement Letter shall be treated as cancelled & referred back to this department for revised Fire Safety Requirement Letter also till then further process of issuing I.O.D. & C.C. shall not be permitted by the competent Municipal Authority.

In view of above as far as this department is concerned, the fire-protection & fire-fighting requirements for the construction of proposed Low-rise Commercial building comprising of Ground for 02 nos. of Power Transformer (DSS) & 02 nos. of Power Transformer (BESS) + 1st floor for cable cellar + 2nd floor for switch gear, battery bank, battery charger with DCDB, RTCC, SCADA, eye wash area, 33 KV ICOG Panel-1, 33 KV ICOG Panel-2, BKR RMU-1, BKR RMU-2, BESS switch gear + 3rd floor for Electric Panel Room & Terrace for OHT,LMR & Terrace open to sky having height of the building is 19.70 Mtrs. from general ground level up to terrace level, as per the details shown in the uploaded plans, signed in token of approval, subject to satisfactory compliance are as follows;

1. ACCESS:

i) There shall be no compound wall on road side, however removable bollard with chain link may be permitted.

2. PROTECTION TO STRUCTURAL STEEL:

i) All the structural steel members i.e. columns, beams etc., shall be protected with the 02 hours fire resisting materials and methods as stipulated under IS 1942- 1960 as application for residential building.

ii) A certificate to that effect that the fire resistance protection has been provided as above shall be furnished from the Structural Engineer as the time of application form occupying the building.

3. COURTYARDS:

i) The available courtyards on all the sides of the building, sloping access road & podium top shall be paved suitably to bear the load of engines weighting up to 48 metric tons each with a point load of 10 Kg/sq.mtr.

ii) All the courtyards shall be in one plane.

iii) Parking shall not be permitted in courtyards & drive ways of Fire appliances.

iv) Courtyards shall be kept free from encumbrances & encroachments.

v) No structure of any type shall be permitted in courtyards of the building.

vi) There shall not be any trees obstructing fire appliances reach in compulsory open spaces required as per DCPR.

4. STAIRCASE:

i) The layout of staircase shall be enclosed type and flight width of staircase shall be as shown on plan and shall be approached (gained) at each floor level through at least two hours fire resistant self-closing door (45 mm. thickness) placed in the enclosed wall of the staircase.

ii) Externally located staircases shall be adequately ventilated to outside air.

iii) Permanent vent at the top equal to 5 % of the cross-sectional area of the staircase shall be provided.

iv) Openable sashes or R.C.C. grills with clear opening of not less than 0.5 Sq.mt. per landing on the external wall of the staircase shall be provided.

v) Structural steel members connected to staircase shall be protected with fire retardant coatings.
vi) No combustibles shall be kept or stored in staircases / passages.
vii) The staircase should not be encroached by shoe-rack, decorative items, earthen spots etc.

Terrace Staircase door;

The staircase door shall be provided in the following manner;

i) The top half portion of the doors shall be provided went louvers.
ii) The latch- lock shall be installed from the terrace side at the height of not more than 1 meter.
iii) The glass front of 6 inch diameter with the breakable glass shall be provided just above the latch lock, so as to open the latch in case of an emergency by breaking the glass.

5. **STAIRCASE AND CORRIDOR LIGHTINGS**:
   i) The staircase and corridor lighting shall be on separate circuits and shall be independently connected so that they could be operated by one switch installation on the ground floor easily accessible to fire-fighting staff at any time irrespective of the position of the individual control of the light points, if any.
   ii) Staircase and corridor lighting shall also be connected to alternate supply.
   iii) Double throw switches should be installed to ensure that lighting in the staircase and the corridor do not get connected to two sources of supply simultaneously. A double throw switch shall be installed in the service room to terminate the stand- by-supply.
   iv) Emergency lights shall be provided in the staircases/corridors.

6. **ELECTRIC CABLE, SHAFT AND ELECTRIC METER ROOM**:
   i) Electric cable conduit shall be exclusively used for electric cables & should not open in staircase enclosure.
   ii) Electric cable conduit shall be sealed at each floor level with non-combustible materials such as vermiculite concrete. No storage of any kind shall be done in electric shaft.
   iii) Electric wiring/ cable shall be non-toxic, non-flammable, low smoke hazard having copper core / fire resistance for the entire building with provision of E.L.C.B. / M.C.B.
   iv) Electric meter room/panel shall be provided at location marked on the plans with electric emergency switch at the ground floor level. It shall be adequately ventilated & easily accessible.
   v) Low & medium voltage wiring running in shaft & in false ceiling should run in separate conduits.
   vi) Water mains, telephone lines, intercom lines, gas pipes or any other service line should not be laid in the duct for electrical cables; use of bus bar / solid rising mains instead of cables is preferred.
   vii) Separate circuits for firefighting pumps, lifts, staircases & corridor lighting shall be provided directly from the main switch gear panel and these circuits shall be laid in separate conduit pipes, so that fuse in one circuit will not affect the others. Such circuits shall be protected at origin by an automatic circuit breaker with its no-volt coil removed.

viii) Master switches controlling essential service circuits shall be clearly labelled & provide in the lobby for emergency operations.

7. ELECTRIC SUB-STATION /TRANSFORMERS: -

1) Only oil type outdoor transformers are allowed installing as per attached plan in the compound / switch yard and shall have industrial type of fencing.
2) A catch pit equal to the total quantity of oil content of the transformer plus 10% reserve shall be provided below the transformers.
3) The tank of the RCC construction and capacity capable of accommodating entire oil of the transformer, shall be provided at the lower level to collect the oil from the catch pit in case of emergency and the pipe connecting the catch pit of the tank, shall be of non-combustible construction.
4) Adequate open space shall be kept around the transformer site/ switchyard for free movement of fire engine in case of emergency.
5) Entire installation of sub-station including switchgear room, capacitors, transformer etc. shall be confirmed to the Indian Electrical Act/ Rules in practice.
6) Cables shall be laid in the cable trenches coated with fire retardant material.
7) Automatic built-in circuit breakers shall be provided in the transformer.
8) Transformer shall be suitable insulated and shall be designated for continuous operation at rated KVA at the secondary terminal under the prevailing service condition at a higher rated voltage.
9) The design, treatment and construction of the transformer and breaking of the windings shall be such as to withstand the heavy mechanical and thermal stresses, which may be experienced under the condition of daily cycle of heating and cooling due to fluctuation in load of dead short circuit or either side of the transformer.
10) All accessories/parts of the switchgear and transformers shall be inspected frequently and carefully for signs of overheating, tracking etc.
11) Automatic built-in circuit breakers shall be provided in the receiving station/ relay room.
12) All the equipment should be suitably earthed.
13) Barricade walls of adequate height should be provided between two transformers, as well as around the both the transformers & Sub-station.
14) Good housekeeping shall be maintained at the premises shall be strictly prohibited.
15) Switches gears shall be housed in separate room, separated from the transformer base by a fire resistant wall of not less than four hours.
16) 02 nos. of Dry Chemical Powder [ABC] type fire extinguisher of 09 kgs. Capacity each with ISI certification mark coupled with eight buckets filled with dry, clean sand shall be kept in the Electrical Sub-Station Cabin.
17) The Electric Sub-Stations are shall be kept prohibited and no unauthorized person shall be allowed to enter in the area.
18) Location, place & capacity of the substation shall be inspected, verified & approved by concerned authorities.

8. FALSE CEILING (IF PROVIDED):

False ceiling if provided in the building shall be of non-combustible material. Similarly, the suspenders of the false ceiling shall be of no combustible materials.

9. MATERIALS FOR INTERIOR DECORATION/FURNISHING:

The use of materials which are combustible in nature and may spread toxic fume/gases should not be used for interior decoration/furnishing, etc.

10. ELEVATION FEATURES (IF PROVIDED):

i) The elevation treatment proposed shall be of non-combustible materials and it should not obstruct fire-fighting activities.

ii) Elevation features of the building shall be as per requirements stated in the circular u/no. CHE/DP/110/Gen, Dated-2019-20 (Circular-DCPR-2034 C-10) & CHE/DP/ 18005/Gen, Dated-31/10/2023.

11. LIFTS:

A) PASSENGER LIFT:

i) Walls enclosing lift shaft shall have a fire resistance of not less than two hours.

ii) Shafts shall have permanent vent of not less than 0.2 sq. meters in clear area immediately under the machine room.

iii) Landing doors and lift car doors of the lifts shall be of steel shuttered with fire resistance of one hour. No collapsible shutter shall be permitted.

iv) One of the lift shall be converted into fire lift and shall be as per specifications laid down under the regulations, a toggle switch shall be provided to this lift for the use of Firemen.

v) Threshold of non-combustible material shall be provided at the entrance of each landing door.

B) FIRE LIFT:

i) To enable fire services personnel to reach the upper floors with the minimum delay, one fire lift within the building from each lift bank shall be provided, and shall be available for the exclusive use of the firemen in an emergency.

ii) The lift shall have a floor area of not less than 1.4 sq. mtrs. with a minimum dimension of 1.12 mtrs. It shall have loading capacity of not less than 545 k.g. (8 persons lift) with automatic closing doors.

iii) The lift shall be provided with an alternate electric supply of an adequate capacity apart from the normal electric supply of the building and the cables shall run in a route safe from fire, i.e. within the lift shaft. In case of failure of normal electric supply, it shall automatically trip over to alternate supply.For apartment houses, this changeover of supply could be done through manually operated changeover switch. Alternatively, the lift shall be so wired that in case of power failure, it comes down at the ground level and comes to stand-still with door open.

iv) Fire lift should be provided with a ceiling hatch for use in case for emergency. So that when the car gets stuck up, it shall be easily openable.

v) The operation of fire lift should be by a simple toggle or two button switch situated in glass-fronted box adjacent to the lift at the entrance level. When the switch is on, landing call points will become inoperative and the lift will be on car control only or on priority control device. When the switch is off, the lift will return to normal working. This lift can be used by the occupants in normal times.

vi) The words ‘Fire lift’ shall be conspicuously displayed in fluorescent paint on the lift landing doors at each floor level.

vii) The speed of the fire lift shall be such that it can reach the top floor from ground level with in one minute.

viii) Fire lift shall be constructed as per prevailing standard.

12. FIRE-FIGHTING ARRANGEMENTS:

a. Underground static water storage tank:–
An underground water storage tank of capacity 1,00,000 litres shall be provided at location marked on the plan, as per the design specified in the rules with baffle wall and fire brigade collecting breaching. The layout of which shall be got approved from H.E.'s department prior to erection. The tanks shall be connected to Wet-riser cum down comer & sprinkler system.

b. Overhead (terrace) water storage tank:–
A tank of 30,000 liters capacity shall be provided at terrace level. The layout of which shall be got approved from H.E.'s department prior to erection. The tank shall be connected to wet riser through pump, through non return valve and gate valve.

c. Fire Service inlet:-

i) A fire service inlet on the external face of the building near the tank directly fronting the courtyards shall be provide to connect the mobile pump of the fire service independently to the riser of Down-comer system of the building.
ii) Operating switches of fire pumps shall be also provided in glass fronted boxes at ground floor.

d. Automatic sprinkler system:–

i) Automatic sprinkler system will be provided in the entire building including lift lobby area/common passage area on every floor level.
ii) Automatic sprinkler system with Sprinkler Riser shall be installed as shown on the plan &as per the standards laid down by N.B.C. and relevant I.S. specification.

e. Automatic Smoke Detection System:-
Automatic smoke detection shall be provided in electric meter room/panel, lift machine room & Pump-room, as per IS specification.

f. Fire pump, booster pump, sprinkler pump and jockey pump:–

i) Wet-riser shall be connected to a fire pump at ground level of capacity not less than 2400 liters/min., capable of giving a pressure of not less than 3.2 kgs/ sq. cms. at the top most hydrant outlet along with jockey pump of suitable size.
ii) Booster pump of 900 liters/min. capacity giving a pressure of not less than 3.2 kg./ sq. cm. at the top most hydrant out let of the wet-riser shall be provided at the terrace level.
iii) A separate Sprinkler pump of suitable capacity along with jockey pump shall be provided for automatic sprinkler system.
iv) Electric supply (normal) to these pumps shall be on independent circuit.
v) Operating switches for pumps shall be also provided in glass fronted boxes in ground floor and terrace at prominent place.
vi) Only surface mounted pump or vertical turbine pumps shall be installed for fire-fighting.

g. Portable fire extinguishers:-

i) One Dry Chemical Powder (ABC) type fire extinguisher of 06 kg capacity having B.I.S. certification mark and two buckets filled with dry, clean sand shall be kept in Electric Meter Room, Pump-room & Lift Machine room & on each floor.

ii) One Dry Chemical Powder (ABC) type fire extinguisher of 06 kg capacity having B.I.S. certification mark and two buckets filled with dry, clean sand shall be kept on each floor.

h. Emergency Evacuation Floor Plan:-

Emergency evacuation /Escape-route plan shall be displayed in common corridor/cross passages, staircase/lift lobbies at each floor level.

i. Public address system:-

The entire building shall be provided with public address system as per the rules with main control operator at console panel at ground floor area.

j. Fire alarm system:-

The entire building shall be provided with manual fire alarm system with main control panel at ground floor level and pill-boxes and hooters at each floor level. The layout of fire alarm system shall be in accordance with I.S. specification.

k. Signages:

Self-glowing/fluorescent exit signs in green colour shall be provided showing the means of escape for each floor.

13. NITROGEN INJECTION FIRE PROTECTION SYSTEM

Nitrogen Injection Fire Protection System shall be provided for power transformers of the Receiving station building as per the relevant standards.

OR

HIGH VELOCITY WATER SPRAY PROJECTOR (EMULSIFYING) SYSTEM :

High velocity Water spray projector (emulsifying) system shall be provided as per the standard laid down by T.A.C. or relevant I.S. specification. The same shall be installed as per the standard laid down by T.A.C. & relevant I.S. specifications.

14. REFUGE AREA:

Terrace floor of the building shall be treated as refuge area & shall conform to,

i) The entrance door to the refuge area shall be painted or fixed with sign painted in luminous paint as “Refuge Area In Case of Emergency”.

ii) Adequate drinking water facility shall be provided in the refuge area.

iii) Adequate emergency lighting facility connected to the electric circuit of the staircase, corridor / passage lighting etc. shall be provided.

THE CONCERNED PARTY HAS PAID SCRUTINY FEES, FIRE & EMERGENCY FEES TIME TO TIME AS MENTIONED BELOW;

Sr. No.	Type of Proposal	Total Gross built up area in Sq. mtrs.	Scrutiny fee paid	Receipt No./SAP Doc. No.	Date

1	Proposal	1303.94	Rs. 25,000/-	Challan No. : 0000175408/25	12.08.2025
			Rs. 6,165/-	Challan No. : CHE/CFO/179685/25	29.08.2025
Fire Service Fees:-					
1	Proposal	1303.94	Rs. 14340/-	Challan No. : 0000175408/25	12.08.2025
			Rs.2,97,302/-	Challan No. : CHE/CFO/179685/25	29.08.2025

Architect/L.S. is requested to get verified the total gross built-up area of the building & inform this department if the same is found to be more, for the purpose of levying additional scrutiny fee, if required.

This Fire Safety Requirement Letter is issued for the proposed building from Fire Risk / Fire Safety point of view only. The plans approved along with this Fire Safety Requirement Letter are approved from Fire Risk / Fire Safety point of view only. Approval of this plan does not mean in any way allowing of construction of the building. It is Architect's / Developer's responsibility to take necessary prior approval from all concerned competent authorities for the proposed construction of the building.

NOTE:-

a) This proposal is directly uploaded by Architect/L.S. without recommendation of E.E.B.P.(CITY) & non-scrutiny by E.E.B.P.(CITY) or Auto scrutiny check by Architect/L.S./E.E.B.P.(CITY) & as per EOBD it is required to issue Fire Safety Requirements. Hence, it is considered and approved only from fire safety point of view. No any contraventions and violations are approved by this dept. as undersigned are not Civil Engineers and Architect/Lic. Surveyor. Hence, this approval shall not be used as precedence & important to approve further civil engineering work or approvals in Architect/L.S. side.
b) Necessary approvals shall be obtained from Hon"ble M.C"s Sir wherever required.
c) This Fire Safety Requirement letter is issued only from Fire Protection & Fire-Fighting requirements point of view on behalf of the online application from Architect/L.S.. The plans approved along with this Fire safety requirement Letter are approved from Fire Risk / Fire Safety point of view only. Approval of this plan does not mean in any way allowing of construction of the building. It is Architect's / Developer's responsibility to take necessary prior approval from all concerned competent authorities for the proposed construction of the building.
d) If any matter pertaining to authenticity or legality shall be cleared by concerned Owner/Occupier/ Developer/ License Surveyor, etc. However, any type of inadequacy, default in the construction of the building other than approved plan is not under purview of this department.
e) The fire-fighting installation shall be carried out only from Government approved licensed agency only.
f) The width of abutting road & open spaces is as mentioned in plans submitted by the Architect/L.S. and these parameters shall be certified by the concerned Architect/L.S.

g) The schematic drawings/plans of automatic sprinkler system, automatic smoke detection system, wet riser system, public address system, manual fire alarm system shall be submitted to CFO.
h) The area, size, etc. for the sprinkler system, detection system, fire alarm system, wet riser system, public address system, Fire duct, electrical duct etc. to be verified & examined by MEP Consultant.
i) Separate necessary permission and license under section 390/394 for any licensable activity shall be obtained from concerned authorities of BMC/CFO's department, till then shall not be allowed to use.
j) BMC/Fire Brigade department reserves the right to change/alter/add/delete the terms and condition of this fire safety requirement letter as per the situation permits.
k) There shall be no any tree located in the compulsory open spaces or in the access way near the Entrance gates.
l) As per section 3 of Maharashtra Fire Prevention and Life Safety Measures Act- 2006, it is the liability of Owner/Occupier to provide & maintain the Fire Prevention & Life Safety Measures in good repair and efficient condition all the time in accordance with the provisions of Maharashtra Fire Prevention and Life Safety Measures Act or the rules.
m) This approval is issued without prejudice to legal matters pending in court of law, if any.

KISHORE DNYANDEO GHADIGAONKAR
Digitally signed by KISHORE DNYANDEO GHADIGAONKAR
Date: 2025.10.03 12:19:41 +05'30'

Scrutinized& Prepared by
DIVISIONAL FIRE OFFICER
MUMBAI FIRE BRIGADE

Verified & Approved by
DY. CHIEF FIRE OFFICER
MUMBAI FIRE BRIGADE

COPY TO:-

1. **Executive Engineer (Building Proposal -City)**
2. **Mr. P.G. Redekar, L.S.**
   M/s. G.M. Arch. Pvt. Ltd.

Section D

Annexure 4

Approved Make list

Annexure 4 Sub-vendor list – FPS System

Sl.No.	Items	Sub-Vendors
1	Pump (Horizontal & Vertical)	KBL- Pune/Kirloskar wadi. M&P -Pune, WPIL Ltd – Ghaziabad, /Kolkata Flowserve Coimbatore, KSB – Pune.
2	Electric Motor	Bharat Bijlee-Mumbai, ABB-Vadodara, Marathon-Kolkata, CGL-Ahmednagar, Siemens-Kalwa, Kirloskar-Bangalore.
3	Diesel Engine	KOEL-Pune, Cummins- Pune, Greaves Cotton- Pune.
4	MS / GI Pipes	Jindal, (GAJAIBAD Up to 350NB) Jindal- Hissar, TATA (Jamshedpur up to 150NB), SAIL-Rourkela, MSL- Raigad (MS), Surya Roshni (Bahadurgarh up to 4000NB).
5	MS (SAW)	PSL- Kandla/Chennai/Jaipur/Daman/Vizag, Ratnamani-Kutch/ Chatral, Welspun-Baruch/Anjar, Mann Industries-Indore, JCO pipes-Chindwara, Lalit Profile-Mumbai, Pratibha Pipes- Mumbai, Surindra Engg- Kalol, Mukat Pipes- Rajpura, Mukat Tank & Vessels- Tarapur/Thane. Shamshi pipes-
6	SS Pipes (ERW & Seamless)	Ratnamani-Kutch, Choksi-Ahmedabad, Remi- Mumbai, Prakash Steelage -Silvasa/Mumbai, SAW Pipe ltd (Jindal) - Nasik, Sumitomo- Japan, Sanyo-Japan.
7	ERW Pipe Fittings (Forged & Formed) and Flanges (ATSM A234/A105/IS 1239 Part-2)	Tube Products-Baroda, Teekay Tubes- Mumbai, Gujarat infra pipes-Baroda, Petrochem industries, Fit-tech industries-Mumbai, MS Fittings-Kolkata, EBY Industries-Mumbai, Siddharth & Gautam- Faridabad, Panjab Forging- Mandi Gobindgarh, NL Hazra-Kolkata. Tube turn- Mumbai, Pipe fit-Baroda.
8	S.S Fittings & Flanges	Flash Forge, Gujarat Infra- Baroda, M.S. Fittings- Kolkata, Tube Products Incorporate – Baroda, Pipe Fit- Baroda, Tube turn -Mumbai, EBY Industries-Mumbai, Siddharth & Gautam- Faridabad,
9	Strainer (Y type & T type)	Spirax masrhall- Pune, -Multitex Filtration -Noida,Otoklin Filters -Mumbai, Grand Prix-Faridabad, Gujrat Otofilt-Ahmedabad, Procedyne Engineers-Chennai, Jaypee- Faridabad
10	Fire Hose with Coupling	Newage- Surendranagar, Chhatariya Rubber & Chemical (CRC)-Gujrat, Shah Bhogilal- Ahmedabad, New Age – Mumbai, Winco - kalol
11	Deluge Valve along with associated trims and instruments (UL/FM approved model Only)	HD Fire- Jalgaon, Tyco(Grinell)-UK/USA, , KIDDE-USA, PRESSAUGE-Germany, UTC fire & security India ltd-Bangalore, Darling – Muesco – Ahemadabad.
12	HV/MV Nozzle & QBD (UL/ FM/ LPCB/ VDS APPROVED)	HD Fire- Thane/Jalgaon, Tyco- USA/UK, KIDDE-USA, Viking-USA/UK UTC fire & security India ltd- Bangalore. Minimax-Germany.
13	Wrapping and Coating Material	Rustech-Kolkota, STP-Jamshedpur, B.M.Concor -Kolkata, Raychem -Chennai.
14	Gate Valve (CI) / NRV	KBL- Pune, L&T Audco- Chennai, Cresent- Ahmedabad, Bankim & company- Howrah, Leader- Jalandhar, BDK-Hubli, Microfinish- Hubli, H Sarker - Howrah, Niton Valves-Mumbai. AV Engg -Agra (300NB).

Annexure 4 Sub-vendor list – FPS System

15	Gate Valve (CS) /NRV	Leader Jalandhar, BDK- Hubli, Microfinish-Hubli, Intervalve-Pune, KBL- Pune, H Sarker (350NB & Class 300) -Kolkata, NIton Valves- Mumbai, KSB -Pune, Steel strong-Mumbai, L&T-Audco- Chennai, Fouress-Mumbai, AV Engg-Agra (Upto 300NB & Class 300).
16	Forged Gate Valve / Globe Valve / Check Valve (up to 50 NB)	Leader-Jalandhar, KSB-pune, Intervalve -Pune (habonim vaas – only for ball valve)- Chennai
17	Gun Metal (GM)/ Bronze Body Valves	Leader Valves- Jalandhar, Sant Valves- Jalandhar, BDK – Hubli, H Sarker- Howrah.
18	Structural Steel	SAIL-India, Jindal- Hissar, TATA- Jamshedpur, RINL- Vizag, Essar- Hazira
19	Inlet Branching Connection	Shah Bhogilal- Ahmedabad, HD Fire-Thane/ Jalgaon, Newage-Surendranagar, New Age – Mumbai. Winco-Kalol.
20	Safety Release Valve	Leader- Jalandhar, Spirax Marshall- Pune,Forbe Marshall-Pune, Fainger Lesser-Aurangabad, Tyco sanmar-Chennai, Levcon-Mumbai
21	Air Release Valve (as per IS 14845)	Indian Valve- Nashik, Fouress-Bengaluru, Leader-Jalandhar,H sarakar-Howrah, New age-Surendranagar , Shah Bhogilal- Ahmedbad
22	SS Ball Valve	L&T Audco- Chennai Microfinish-Hubli, Leader-Jalandhar, BDK- Hubli, intervalve-Pune, Habonim Vass- Chennai.
23	Paints	Asian Paints, Berger, Shalimar, AkzoNobel, Jotun.
24	Hume Pipe	Repute make with ISI mark
25	Pressure Relief Valve	Leader- Jalandhar, Spirax Marshall- Pune, Forbes Marshall-Pune, Tyco sanmar-Chennai, Fainger Lesser-Aurangabad, Fisher Sanmar-Chennai, WEIR BDK -Hubli
26	Welding Electrode	Ador/ ESAB/ D&H Sechron (Brand shall be approved by Tata Power)
27	Fire Alarm Panel (UL / FM / VDS approved)	Notifire-UK , Schrack- Vienna, Siemens – Fire Finder- Holland , Autronica (Any UL / FM / VDS approved models only)
28	LHS cable & its	Patol -UK (Any UL / FM / VDS approved models only)
29	IR Detector	Patol -UK, Notifier -UK (Any UL / FM / VDS approved models only)
30	Hose Box	Newage-Surendranagar, HD fire-Thane/Jalgaon, Sukan equipment- Ahmedabad, Shah Bhogilal- Ahmedabad (ISI Marking)
31	Hydrant Valve	Newage-Surendranagar, WINCO-Kalol, Shah Bhogilal-Ahmedabad, New Age – Mumbai, HD-Fire- Mumbai
32	Water Monitor	Newage-Surendranagar, WINCO-Kalol, Shah Bhogilal-Ahmedabad, New Age – Mumbai, HD-Fire - Mumbai
33	Butterfly Valve	KBL-Pune, Fouress-Bengaluru, L&T Audco-Chennai, Tyco Valves-Mumbai, R&D Multiples -Daman,BDK-Hubli, Crane process flow-Satara.
34	Fire extinguisher	As per IS approved

Annexure 4 Sub-vendor list – FPS System

35	Deluge Valve Control Panel	Pyrotech-Gurgaon, Venus, Risha Control, Suchitra, Anand Controls, VM fab-Mumbai
36	Motor Control Panel	L&T- Ahmednagar, Siemens-Kalwa, ABB-Nashik, C&S-Newdelhi, VM fab-Hyderabad, Maatech-Jalgaon, Dharia-Mumbai
37	LT Power & Control Cables.	Polycab-Daman, KEI-Silvasa& Bhiwadi, Universal-Satna, Gemscab- Rajasthan, KEC (RPG)-Vadodara, Ravin-Pune, Thermo cables-Hyderabad, Cord Cables-Newdelhi,
38	Equipment's in Control System	Make shall be as per Project Specification.
39	Detectors, MCP, Interface modules, Fault isolators, Limit switches, solenoid valves, Hooter/ Hooter cub strobe & other items pertaining	U/L approved makes Only.

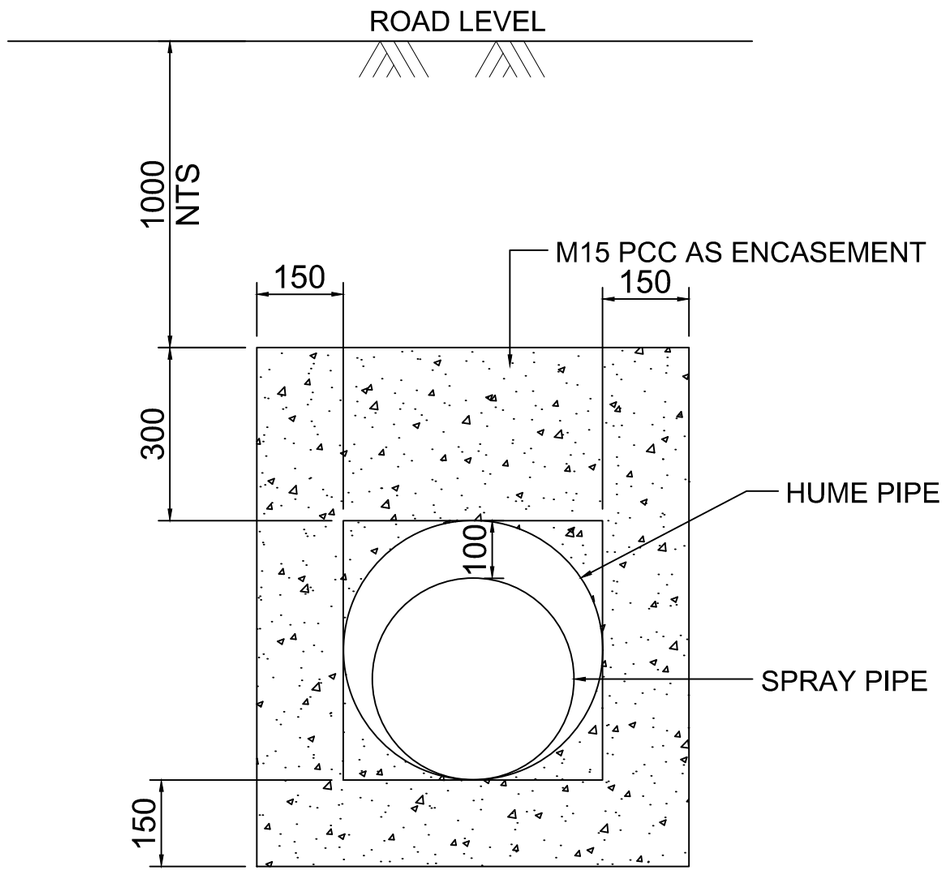
Note: -

1. If any item missing in above list and required for completion of project. Bidder to take prior approval from Tata Power before placement of the order.
2. Make specified in the Project specification (if any) shall supersede the make listed above.

Section D

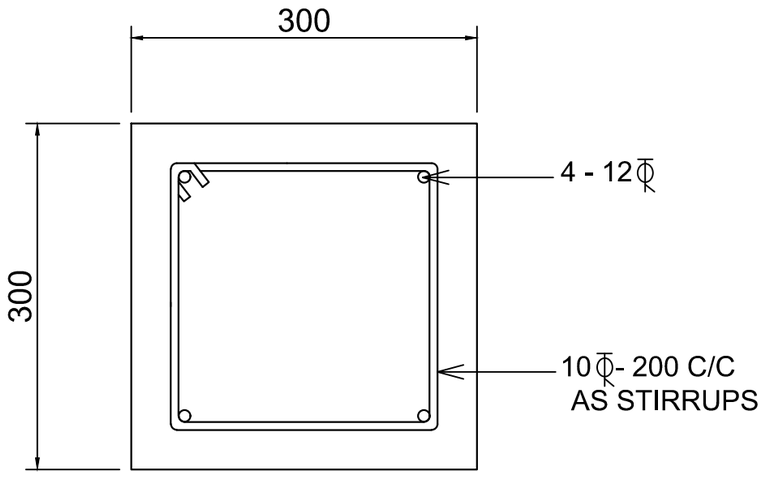
Annexure 5

Typical Civil Detail



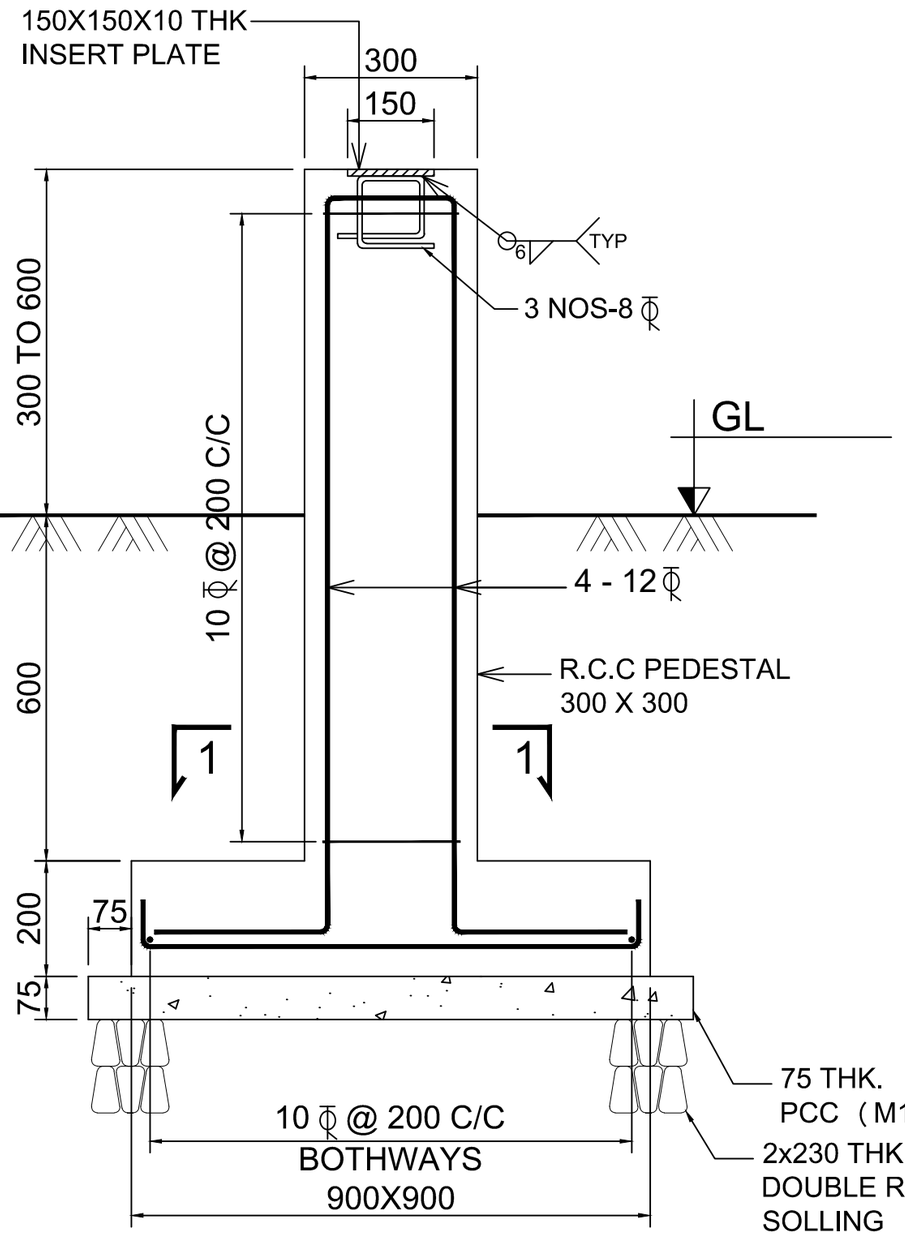
PIPE COVER DETAIL BELOW ROAD

SCALE 1 : 100



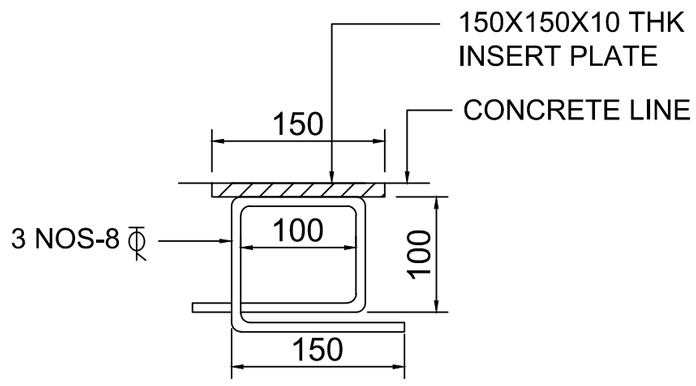
SECTION - 1 : 1

SCALE - 1:50



PIPE SUPPORT ABOVE G.L.

SCALE 1 : 100



INSERT PLATE DETAIL
(FOR 150 x 150 x 10 THK. PLATE)

SCALE 1 : 50

TENDER PURPOSE ONLY

NOTES :-

1. ALL DIMENSION ARE IN MM. & ALL LEVEL ARE IN MTRS.
2. ϕ REPRESENTS HIGH YIELD STRENGTH CORROSION RESISTANT DEFORMED BARS (FE 500) CONFORMING TO IS 1786.
3. CONCRETE GRADE M-20 U.N.O. (IS CODE 456 / 2000)
4. CLEAR COVER TO MAIN BARS.
   - A. FOOTING BOTTOM 75 mm.
   - B. FOOTING TOP & SIDE 50 mm.
   - C. COLUMN 40 mm.
5. LAP LENGTH SHALL BE MIN. '50 D' .
6. CEMENT SHALL BE OPC 43/53 CONFORMING TO IS 8112 .
7. STRUCTURAL DETAILS SHALL BE AS PER DESIGN. HOWEVER THE SAME IS TO SATISFY THE MINIMUM CRITERIA SHOWN IN THIS DRAWING. DESIGN SHALL BE DONE AS PER GUIDELINES SPECIFIED IN SPECIFICATION.

REV	REVISIONS	DRN	CLEARED CIVIL	ELEC	I & C	MECH	P & L	AUTOM	APPD	DATE

THE TATA POWER COMPANY LIMITED

PROJECT: UPGRADATION OF FPS FOR R/S IN MUMBAI REGION

TITLE: TYPICAL DETAIL OF SUPPORT & COVER FOR FIRE HYDRANT PIPE LINE

CLEARED		
DEPT	SIGNATURE	DATE
CIVIL		
ELEC		
I&C		
MECH		
P&L		
AUTOM		

SCALE : AS NOTED
DRAWN : MANGESH
CHECKED : AS
REVIEWED: PTM
APPROVED: SC

DWG. NO.: 1
DATE: (REV.0 ISSUE) 09/08/2018
DATE: (CURRENT REV.) 09/08/2018
REV. NO.: A

\\Anant\corporate engineering\01Proj Engg\02Engg ISO\DOCUMENTS\FORMS\Inhouse Dwgs- (A0 to A4)

FORM NO. ENG-FM-40-R1

1.0 DEFINITION OF TERMS AND PRELIMINARY CONDITION OF CONTRACT

1.1 DEFINITIONS:

1.1.1 In the Contract (as defined below), unless the context requires otherwise the words and expressions defined below shall have the meaning hereinafter assigned to them.

1.1.2 "Affiliate for Owner" shall mean an entity controlled by a Party directly or indirectly through ownership of voting securities or by Contract or otherwise. "Affiliate for Contractor" shall mean an entity controlling, controlled by, or under the common control with, a Party directly or indirectly through ownership of voting securities or by Contract or otherwise.

1.1.3 "Annexure" means all appendices, annexure and schedules annexed to this Contract or incorporated by reference herein and shall include all amendments and revisions thereto made by mutual agreement of Owner/Project Manager and Contractor in accordance with the provisions contained in this behalf in this Contract.

1.1.4 "Applicable Laws" means all laws, treaties, ordinances, rules, regulations applicable in India and amendments, re-enactments, revisions, applications, and adaptations thereto made from time to time and in force and effect, judgements, decrees, injunctions, writs and orders of any court, arbitrator or governmental agency or authority, rules, regulations, orders and interpretations of any Governmental Instrumentality, court or statutory or other body having jurisdiction over construction of the Facility on the Facility Site, performance of the Work or supply of Goods, including Applicable Permits, as may be in effect at the time of performance of work or supply of Goods hereunder by the Contractor, which time would include Defects liability period as appropriate, provided, however, that if at any time the Applicable Laws are less stringent than the standards set forth in the Contract hereto, the standard set forth in the contract hereto shall be deemed to be the standards under Applicable Laws.

1.1.5 "Applicable Permits & Clearances" means any and all permits, clearances, authorizations, consents, licenses (including without limitation any import or export licenses), lease, ruling, exemption, filing, agreements, or approvals, required to be obtained or maintained in connection with construction of the Works on the Site, performance of Work, respectively by the Contractor and the Owner/Project Manager in accordance with the Contract and their maintenance, as may be in effect at the time of Contractor's performance of Work or supply of Goods hereunder.

1.1.6 "Bid" means the offer of the Contractor to the Owner/Project Manager in response to the Tender Document as set forth in the Final Proposal.

1.1.7 "Business Day" means a day other than a Sunday or public holiday on which banks are open for domestic business in the city/area where project site is located.

1.1.8 "Cause" in relation to the revocation or amendment of any Permit means any fact or circumstance, including without limitation any default, neglect or failure to abide by any of the terms and conditions of such Permit.

1.1.9 "Change in Law" means the occurrence of any of the following after the Effective Date of this Agreement.

a) The enactment of any or issuance of any new Indian law that becomes applicable law

b) The amendment or repeal, or re-enactment of any existing Applicable law

c) A change in the interpretation or application or enforcement of any Applicable Law by Government instrumentality

d) The revocation or cancellation of any Applicable Permit unless due to a cause attributable to the Contractor.

"Change in Law" shall however exclude:

a) Any change in minimum wages or change in market labour rates whether or not arising out of or pursuant to any new enactments of labour laws including but not limited to Payment of Minimum Wages Act and including periodic revisions in the minimum wages announced by the authorities which shall be deemed to be factored in the Contract Price / price variation clause if any mutually agreed.

b) Any changes in price of fuels (petrol and diesel), oils and lubricants or the likes pursuant to any ministry / government notifications thereon which shall be deemed to be factored in the Contract Price / price variation clause if any mutually agreed.

c) Any inflation of basic price of input materials which shall be deemed to be factored in the Contract Price / price variation clause if any mutually agreed.

1.1.10 "Change Order" means a written order from the Owner/Project Manager to the Contractor after the Effective Date of the Contract requiring a change in any part of the Work or supply of Goods that may involve:

a) A change in the Scope of Work or supply of Goods,

b) An additional Work or supply of Goods,

c) The omission of a portion of the Work or supply of Goods or

d) If appropriate, an adjustment in one or more of the (i) Contract Prices, (ii) Completion Dates, (iii) Milestone Payment Schedule, (iv) any of the Performance Guarantees, or (v) any provision of this Contract including any Annexure or Schedule hereto or

e) Any of the above in combination.

1.1.11 "Change Order Notice" means a written proposal issued and signed by Owner/Project Manager requesting a change, submitted to Contractor by Owner/Project Manager.

1.1.12 "Change Order Request" means a written notice to Owner/Project Manager issued by Contractor indicating that a change order is required in connection with the performance of the work or supply of goods.

1.1.13 "Commissioning" shall mean integrated activity covered under "Preliminary Operation", "Initial Operation", "Trial Operation" and carrying out "Tests before Taking-Over" of Relevant Package under the Contract.

1.1.14 "Contract" means the documents as set out in the form of Contract Agreement in relation to the Work between the Parties as may be amended, supplemented or modified from time to time by agreement in writing between the Parties.

1.1.15 "Contract Period" or "Period of Contract" or "Contract duration" means the period from the Effective date up to and including the last day of the Defect Liability Period.

1.1.16 "Contract Price" or "Contract Value" or "Contract Sum" means the lump sum fixed price or unit rates of items as stated in the Contract or such price as may be modified and as payable by the Owner/Project Manager to the Contractor in consideration of it performing the Works or supply of Goods including all obligations of the Contractor under and in accordance with the provisions of the Contract.

1.1.17 "Contractor's Works" shall mean the places which are used by the Contractor or any of its sub-vendor / Sub-contractor for the manufacture of equipment or fabrication of materials for the performance of Work.

1.1.18 "Contractor's Equipment" means all machinery, apparatus, equipment, appliances, Materials, items and other things (other than temporary Works) of whatsoever nature required for the execution and completion of the Works, performance of the Contractor's obligations under the Contract including supply of Goods and Work, establishing of Performance Guarantees, and the remedying of any defects and deficiencies, but does not include equipment, apparatus, appliances, machinery, Materials, items and other things of whatsoever nature intended to form or forming part of the Works or Relevant Package or the Plant/Facilities.

1.1.19 "Contractor" means the entity / person / joint venture or consortium whose Bid has been accepted by the Owner/Project Manager and is awarded the Works under this Contract, and the legal successors in title to such person who satisfies the qualification criteria set forth in the Tender Documents.

1.1.20 "Contractor Permits" means all Permits, required by the Contractor from any Government Instrumentality for the performance of his obligations.

1.1.21 "Contractor's Representative" means the person named as such in the Contract or other person appointed and from time to time communicated in writing to the Owner/Project Manager by the Contractor in his place in accordance with the terms of the Contract.

1.1.22 "Contractual Time for Completion" shall mean the timeline set forth for the successful completion of all the Works including 'Tests before Taking Over' and issuance of Provisional Acceptance Certificate (PAC) by the Owner/Project Manager as per clause 8.1 of this Section.

1.1.23 "Completion of Works" shall mean successful completion of all Works including Performance Tests (if any) and 'Tests Before Taking Over' and issuance of Final Acceptance Certificate (FAC) by the Owner/Project Manager as per clause 8.2 of this Section.

1.1.24 "Consultant" or "Engineer" shall mean Consulting Engineers appointed by the Owner/Project Manager for the Project and shall include their duly authorised representatives.

1.1.25 "Day" means a calendar Day of 24 (twenty-four) hours and "Year" means 365 (three hundred and sixty-five) days.

1.1.26 "Documents" means and includes all design documents, engineering documents, Drawings, calculations, computer software (programs), computer media, samples, patterns, models, construction documents, erection documents, Operation and Maintenance Manuals, and other manuals, and the like as well as, all other data and information to be submitted by the Contractor and shall include without limitation, engineering, design and construction drawings, data sheets, specifications, plans, bills of Materials and estimates.

1.1.27 "Drawings" shall mean all:

a) Drawings furnished by the Owner/Project Manager or the Consultant.

b) Supplementary drawings furnished by the Owner/Project Manager or the 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/Project Manager or the Consultant.

d) Engineering data and drawings submitted by the Contractor during the progress of the Work under the Contract, provided such engineering data and drawings are acceptable to the Consultant or the Owner/Project Manager.

1.1.28 "Effective Date" or "Effective Date of Contract" or "Date of award" means the date on which the Contract comes into force and effect, i.e. the date of issue by the Owner/Project Manager of the Letter of Intent or Notice to Proceed or as defined in the Contract Agreement.

1.1.29 "Facility" or "Plant" means, collectively, the Relevant Package, other Packages either awarded or to be awarded at a later date to Other Contractors and other apparatus, appliances, machinery, equipment, components and other Works, together with all auxiliaries, Materials, apparatus, appliances others things whatsoever and related buildings as an integrated whole, including without limitation all systems and sub-systems thereof and related facilities, including without limitation any and all appliances, parts, instruments, appurtenances, accessories and other property that may be incorporated or installed in or attached to or otherwise become part of the Plant or as envisaged in the Contract or which otherwise constitutes a part of the Facility and located on Site.

1.1.30 "Final Take-over" means the acceptance by the Owner/Project Manager of the Works as a whole in accordance with Contract.

1.1.31 "Final Payment Certificate" means the payment certificate issued by the Owner/Project Manager or his Representative thereof to the Contractor.

1.1.32 "Financing Document" means any document relating to the: Debt or equity financing to the Owner/Project Manager for provision of funds for the development, Design, construction and /or operation of the Plant; or funds for refinancing part or whole or take-out of any such financing.

1.1.33 "Force Majeure Event" shall have the meaning set forth in clause no. 17.0 of these Conditions of the Contract.

1.1.34 "Foreign Currency" means a freely convertible currency, specified in the Schedule of Prices mentioned elsewhere in Contract in which part of the Contract Price is payable, but not Indian Rupees.

1.1.35 "General Conditions of Contract" means also referred as "GCC" means these Terms and General Conditions of Contract as mutually amended in accordance with the provisions contained in this behalf herein as applicable to scope of supply of Goods or Works.

1.1.36 "Goods" means all of the materials, equipment, machinery, apparatus, appliances, components and/or other Materials and things, which the Contractor is required to supply to the Owner/Project Manager under the Contract.

1.1.37 "Good Engineering Practices" means those practices, methods, acts, techniques and standards as may be followed or employed in the performance of the Work or supply of Goods and discharge of its obligations by the Contractor and which (i) are generally accepted internationally for use in the Construction and electric utility industry, taking into account conditions in India, in connection with the works of the same or similar size and type as the Relevant Package, (ii) are commonly used in prudent engineering, construction, project management and operations, and (iii) would be expected to result in performance of the Services and completion of Works in a manner consistent with Applicable Laws, Applicable permits, reliability and safety.

1.1.38 "Government Instrumentality" or "Government" means the Government of India, the Government of State and any other State, or any political subdivision, ministry, department, agency, corporation, commission or any regional, local or municipal authority or governmental body thereof or any other governmental or statutory body under the direct or indirect control of

the Government of India or Government of State or of any other State, or of any political subdivision, ministry, department, agency, corporation, commission, or any regional, local or municipal authority or governmental body thereof, and shall include without limitation any other governmental or statutory body having jurisdiction over the facility or over the performance of any part of Work or the Works or any obligation of the Contractor or the Owner/Project Manager under the Contract.

1.1.39 "Guaranteed Completion Date" or "Guaranteed Completion Dates" means, individually or collectively, the date by which contracted Works for the Relevant Package shall be completed as per the agreed Contractual Time for Completion.

1.1.40 "Hazardous Materials" means (i) hazardous materials, hazardous wastes, hazardous substances, toxic substances or contaminants as those terms are defined under any environmental law or regulation, including, but not limited to, Applicable Laws, and in the regulations adopted or promulgated pursuant thereto; (ii) petroleum and petroleum products including crude oil and any fractions thereof; (iii) any other hazardous, radioactive, toxic or noxious substance, material, pollutant, or solid, liquid or gaseous waste; and (iv) any substance that, whether by its nature or its use, is subject to regulation under any environmental law or with respect to which any applicable environmental law or any Governmental Instrumentality requires environmental investigation, monitoring or remediation.

1.1.41 "Inspector" shall mean the authorised representatives appointed by the Owner or Project Manager or the Consultant or Owner's/Project Manager's Third-Party Inspection Agency for purpose of the inspection of materials / Equipment / works / Services.

1.1.42 "Intellectual Property" means copyrights conferred under statute, common law or equity in relation to inventions (including patents) registered and unregistered trademarks and service marks registered and unregistered designs, circuit layouts, confidential information, proprietary information and all other rights resulting from intellectual activity in the industrial, scientific, literary or artistic fields."

1.1.43 "Interim Payment Certificate" means any payment certificate other than Final Payment Certificate, issued by the Owner/Project Manager.

1.1.44 "Latent Defect" shall mean the defects inherently lying within the Goods or Works which do not manifest during normal inspections carried out by the Owner/Project Manager or the defects inherently lying within the Goods or Works or the Relevant Package which do not manifest during the normal operations and maintenance of the Relevant Package / Plant during the Defects Liability Period.

1.1.45 "Liquidated Damages" means the appropriate measures of the damages for such delays or such shortfalls in performance by the Contractor and are neither penalty nor consequential damages sustained by Owner/Project Manager as a result of such delays and / or shortfalls, as set forth in relevant clause hereof.

1.1.46 "Manuals" means all the various instruction manuals to be provided as per the Contract by the Contractor and shall include Manuals described in Specifications or General Conditions of Contract.

1.1.47 "Manufacturer" means any entity or firm who is the producer and furnisher to the Contractor of any material or designer and fabricator of any equipment / systems which is to be incorporated in or forms part of the Plant / work.

1.1.48 "Materials" means Goods and other things of all kinds to be provided and incorporated, to be used in the permanent Works / Plant/ Works by the Contractor, including Goods purchased by

the Owner/Project Manager and supplied to the Contractor or as a free issue or the supply-only items (if any) which are to be supplied by the Contractor under the Contract.

1.1.49 "Milestone Payment Schedule" means the document which sets forth the limits of payments to be released (worked out, inter alia, on the basis of payment terms agreed by the Owner/Project Manager) by linking such payment limits (in terms of percentages) with detailed milestones commencing from the Effective date. Such percentages shall be with reference to the Contract Price.

1.1.50 "Month" shall mean calendar month or a period of 30 (thirty) days as relevant to the context.

1.1.51 "Monthly Progress Report" or "Progress Report" means a progress report of the Works meeting the requirements set forth in Specification hereto or as instructed by the Owner/Project Manager.

1.1.52 "Notice in Writing" or "Written Notice" shall mean a notice in writing, typed or printed or hand written characters, sent (unless delivered personally or otherwise proved to have been received) by registered post or by electronic transmission to the last known private or business address or registered office of the addressee and shall be deemed to have been received when in the ordinary course of post or by electronic media it would have been delivered.

1.1.53 "Other Contractor" shall mean Contractors engaged by Owner/Project Manager for carrying out other works / work packages and other allied infrastructure facilities required for the Facility / Project.

1.1.54 "Owner" shall have the meaning as defined in the Special Conditions of Contract (SCC) or shall mean The Tata Power Company Limited (in case not defined in SCC) in the in its capacity as Owner of the Facility and the Works and shall include its successors and assigns, as well as authorised officers. "Project Manager" shall have the meaning as defined in the SCC (or shall mean The Tata Power Company Limited (in case not defined in SCC) and shall include its successors and assigns and shall include the authorised officers who can act as Owner's/Project Manager's representative for the Contract.

1.1.55 Owner's/Project Manager's Representative" means the person appointed by the Owner/Project Manager from time to time and notified as such to the Contractor to act as Owner's/Project Manager's Representative for the purposes of the Contract.

1.1.56 "Owner's/Project Manager's Instructions" shall mean any drawings, instructions, details, directions and explanations, in Writing issued by the Owner/Project Manager or the Consultant from time to time during the subsistence of the Contract.

1.1.57 "Owner/Project Manager Permits" means the permits, authorisations, consents and approvals required by the Owner/Project Manager to own, posses, operate and maintain the Works and to operate it for intended purpose.

1.1.58 "Party" means Owner/Project Manager or Contractor individually and "Parties" means Owner/Project Manager and Contractor collectively.

1.1.59 "Permanent Works" means the Permanent Works, equipment and Materials including all civil, electro-mechanical works designed, engineered, manufactured, installed, erected, supplied, executed, commissioned or tested in accordance with the Contract and which form part of the Facility.

1.1.60 "Performance Guarantees" or "Warranty" shall have the meaning set forth in Technical Specifications of Contract.

1.1.61 "Performance Test" means, the test to be carried out in accordance with the provisions of Technical Specifications of Contract to prove and establish the Performance Guarantees as per Technical Specifications of Contract.

1.1.62 "Permit" means any valid permit, authorisation, license, registration, approval, consent, waiver, and exemption, No-Objection Certificate, Approval, variance, franchise or any similar order of or from any Government Instrumentality, court or other body having jurisdiction over the matter in question.

1.1.63 "Person" means any individual, corporation, partnership, association, joint stock Company, trust, unincorporated organisation, Hindu undivided Family, joint venture, consortium, government or political subdivision or agency thereof.

1.1.64 "Preliminary Operation" means all activities undertaken as part of Commissioning after Civil and Mechanical Completion up to commencement of Initial Operation and shall include mechanical and electrical checkouts, calibration of instruments and protection devices, Commissioning of sub supporting systems and chemical cleaning of the system/equipment covered under Contract.

1.1.65 "Project" shall have the meaning as defined in the SCC and shall include the Facility and all the Works that are necessary for the Project.

1.1.66 "Project Documents" mean collectively this Contract, the State Implementation and Support Agreement, the Land Lease Agreement, Transportation Agreement and any other contracts entered into or to be entered into by the Owner/Project Manager with Other Contractors in connection with the Project including without limitation any contracts for Related Works.

1.1.67 "Provisional Acceptance" or "Take-over" means the provisional acceptance by the Owner/Project Manager of the Works, pursuant to the provisions of hereof.

1.1.68 "Prudent Utility Practices" means those practices, methods, equipment specifications and standards of safety and performance, as the same may change from time to time, as are generally accepted for use in electricity generating utilities taking into account conditions in India and commonly used in prudent electricity generation utility engineering and operations including design, engineering construction, erection, installation, Commissioning, testing, operation of the equipment comprised therein lawfully, safely, efficiently and economically for facilities of the type and size similar to the Project and that generally conforms to the Equipment Manufacturer's operation and maintenance guidelines and also any guidelines provided in this regard by any Government or statutory organisation or a Rating agency and the like.

1.1.69 "Punch List" means the list prepared by Owner/Project Manager at the time of Provisional take - over and thereafter periodically revised by Owner/Project Manager as necessary, and in any case updated by Owner/Project Manager within 20 (twenty) days following Owner's/Project Manager's receipt of a Notice of Final take-over, in each case with the full co-operation of Contractor, which list shall set forth certain items of Work which remain to be performed by the Contractor in order to ensure that the Works fully complies with all of the standards and requirements set forth in the Contract.

1.1.70 "Related Works" shall mean other than the Work under the Contract performed or to be performed by the Owner/Project Manager or Owner's/Project Manager's Other Contractors in connection with the Facility either prior to, concurrently or subsequently with the Works within or outside the Site with whom the Contractor shall co-ordinate and interface his activities covered by the Contract.

1.1.71 "Relevant Package" means, design (if applicable), engineering (if applicable), manufacturing, shop fabrication, assembly, testing and inspection at supplier's work, packing, dispatch, shipping,

inland transportation to Site, insurance up to time of Taking Over, delivery at Site, receipt, unloading, handling, storage and in-plant transportation at Site, site fabrication, erection installation, testing, commissioning, performance testing (as applicable) and handing over of the subject package as per the Requirement Specifications / Scope of Work defined in the Technical Specifications.

1.1.72 "Schedule" shall have the meaning set forth in relevant clause hereof.

1.1.73 "Site" or "Project Site" means all those parcels of land owned by Owner/Project Manager on which the Works will be located, as more particularly identified on the site plan and described in Drawings forming part of Contract hereto.

1.1.74 "Sub-contractor" means any person named in the Contract as a Sub-contractor, sub-vendor, Manufacturer or supplier for a part of the Works or any person to whom a part of the Works has been sub-contracted and the legal successors in title to such Person, but not any assignee of such Person.

1.1.75 "Take- over" or "Taking Over" shall mean taking-over of the Works for the purpose envisaged under the Contract upon completion of the Performance Tests and fulfilling the conditions as mentioned in relevant clause hereof.

1.1.76 "Take-over Certificate" means the certificate issued under relevant clause hereof.

1.1.77 "Temporary Works" means all temporary works of every kind (other than Contractor's equipment) required for the execution and completion of the Works and the remedying of any defects.

1.1.78 "Tender Documents" means the Invitation to Bid together with all documents & amendments thereto and clarifications if any issued by the Owner/Project Manager or the Consultant from time to time in respect thereof.

1.1.79 "Tests" means all tests to be undertaken by the Contractor under or pursuant to the Contract including all the tests set forth in Technical Specifications.

1.1.80 "Tests before Take-over" means the tests prescribed in the Technical Specifications mentioned elsewhere in the Contract and any other such tests as may be agreed between the Owner/Project Manager and Contractor or instructed as a Change Order, which has to be carried out by the Contractor before the Taking Over of the Works.

1.1.81 "Trial Operation" shall have the same meaning as per Technical Specification of Contract.

1.1.82 "Technical Specifications" or "Specification" means all the specifications, drawings, datasheets, BOQ, scope etc which are part of Contract and which form part of technical, performance, workmanship, warranty, scope and all other requirement of the Works as stated therein.

1.1.83 "Warranty Period" or "Defects Liability Period" shall have the meaning as elaborated in Clause no. 10.2.

1.1.84 "Works" or "Services" means all the work and obligations of the Contractor under the Contract including without limitation, the work and services briefly described in Specifications including permanent works and temporary works as appropriate under the Contract.

1.1.85 "Writing" shall include any manuscript, typewritten e-mail or printed statement, under or over signature and/or seal of the originator or author as the case may be.

1.2 **Headings and Marginal Notes**

1.2.1 The section headings and marginal notes are not part of these Conditions and shall not be taken into consideration in their interpretation.

1.3 **Interpretation**

1.3.1 Words importing Persons or Parties shall include related firms and corporations and any organisation having legal capacity. Words importing the singular also include the plural and vice versa where the context requires. Words importing one gender also include other genders.

1.3.2 Unless inconsistent with the provisions of the Contract, the meaning of any shipping terms and the rights and obligations of the parties there under shall be as set forth in the latest International Chambers of Commerce (ICC) official rules for interpretation of trade terms as per "INCOTERMS 2020".

1.3.3 The term Contractor shall include its Sub-contractor as the context requires.

1.4 **Law, Language and Measurements**

1.4.1 Applicable law to this Contract shall be the Indian Law. The respective rights, privileges, duties and obligations of the Owner/Project Manager and the Contractor under this Contract shall be governed and determined by the Laws of State and of the Republic of India.

1.4.2 The official text of this Contract shall be English, regardless of any translation that may be made for the convenience of the Parties. All correspondence, information, literature, data, manuals, definitive documents, notices, waivers and all other communication, written or otherwise, between the Parties in connection with this Contract shall be in English language only.

1.4.3 All measurements shall be in metric system.

1.5 **Stamp Duty and Similar Charges**

The costs of stamp duties and similar charges imposed by the Applicable Law (including but not limiting to Indian Stamps Act & Indian Registration Act) on the Contract or Agreement or any part thereof shall be borne by the Contractor.

1.6 **Effective Date of Contract**

The Contract shall be deemed to have come into force and effect from the date of issue of the Letter of Intent (LOI) or Purchase Order (PO) by the Owner/Project Manager to the Contractor or date of signing of the Contract / Contract Agreement whichever is earlier.

1.7 **Priority of Documents**

The order of precedence of the following documents shall be as listed herein below. The Contractor is deemed to have full knowledge and understanding of the contents of all the documents whether contained in or incorporated by reference thereto, and accepted all the terms and conditions contained therein:

a) The Contract Agreement including Special Conditions of Contract, and General Conditions of Contract, Schedule of Prices, all Schedules and Appendices, Technical Specifications

b) Owner's Letter of Intent to the Contractor

c) Post tender correspondence including jointly signed minutes of meetings with the Contractor and jointly signed record notes of tender negotiations

d) Tender document

The order of precedence for Annexures to Contract Document shall be as listed herein below:

(i) Contractor's Implementation Plan including Contractor's Organization and Key Personnel

(ii) Approved List of Sub-contractors & Vendors

(iii) Responsibility Matrix for Permits, Approvals and Clearances as they shall apply to this Contract Agreement

(iv) Owner's / Project Manager's Contractor Safety Terms & Conditions, Health Safety & Environment Policies, Responsible Supply Chain Management and Sustainability Policies

In the event of any ambiguity or conflict between any of the foregoing Contract Document, the Contractor shall prior to the commencement of supplies or work be deemed to have clarified from the Owner/Project Manager any such ambiguities or conflicts.

1.8 **Documents on Site**

The Contractor shall keep on the site one complete set of the Contract, the Documents, Change Orders, communications given or issued under various clauses duly authenticated by the Owner's Representative. These Documents shall be either true copies or original documents, the same being verified as true copies by Owner's Representative. The Owner/Project Manager, the Owner's Representative and his delegates (as referred to in sub-clause 2.4) shall have the right to use such Documents at all reasonable times.

1.9 **Communications**

All certificates, notices, instructions, communications, consents, approvals, orders or determination to be given to the Contractor by the Owner/Project Manager or the Owner's Representative, (in as many copies required) and all notices or communication, to be given to the Owner/Project Manager or to the Owner's Representative by the Contractor, shall be in Writing and may either be delivered by hand against written acknowledgement of receipt, or be sent by airmail or one of the agreed systems of electronic transmission as agreed by the Owner/Project Manager. The Contractor shall maintain a separate set of copies of all the inward and outward correspondences which should be produced at any time if need be. The Contractor shall act or modify actions only on the basis of valid written communications received from the Owner/Project Manager / Owner's representative and would need to provide the documentary evidence (correspondences received from Owner/Project Manager / Owner's Representative) if required by the Owner/Project Manager.

1.10 **Provision of Documents**

1.10.1 The Documents referred to in Technical Specifications shall be in the custody and care of the Contractor. The Contractor shall furnish to the Owner/Project Manager / Owner's Representative Documents, Drawings, etc. as per Technical Specifications.

1.10.2 In addition, and without prejudice to the foregoing, the Contractor shall provide to the Owner/Project Manager "as built" Drawings of the Relevant Package consequent to Provisional Acceptance and only after the delivery of such as built Drawings, the Final Acceptance shall take effect.

1.11 **Contractor's Use of Owner/Project Manager's Documents**

1.11.1 Copyright in the Owner/Project Manager's requirements and other Documents issued by the Owner/Project Manager or the Owner's Representative to the Contractor shall (as between the parties) remain the property of the Owner/Project Manager. The design, engineering, Drawings

and Works layout shall be with the Owner/Project Manager. Contractor may, at its Cost, copy, use and communicate any such documents for the purposes of the Contract. They shall not, without the Owner/Project Manager's consent, be used, copied or communicated to a third party by the Contractor, except as necessary for the purposes of the Contract including performance of Work.

1.11.2 The Contractor shall indemnify and hold Owner/Project Manager, harmless from time to time from and against any all losses, claims, suits, proceedings, taxes, penalties, liability, damages, costs and expenses, suffered or incurred, arising out of or in connection with breach of this clause by the Contractor. If these Documents are received by a third party from the Contractor and the third party makes use of these Documents to cause harm or monetary loss to the Owner/Project Manager or use these Documents for their personal gain / monetary gain, the Contractor shall compensate the Owner/Project Manager for the loss suffered as well as for the value of gain derived by third party.

1.12 **Confidential Details**

1.12.1 The Contractor shall treat the details of the Contract as private and confidential, except to the extent necessary to carry out his obligations hereunder. The Contractor shall not publish, permit to be published, or disclose any particulars of the Contract in any trade or technical paper or elsewhere without the prior consent in writing of the Owner/Project Manager at the Owner/Project Manager's sole discretion.

1.12.2 The Contractor shall indemnify and hold Owner/Project Manager harmless from time to time from and against any all losses, claims, suits, proceedings, taxes, penalties, liability, damages, costs and expenses, suffered or incurred, arising out of or in connection with breach of Confidentiality obligations under this clause. If the confidential details relating to this Contract or its contents are received by a third party from the Contractor and the third party makes use of these details to cause harm or monetary loss to the Owner/Project Manager or use these Documents for their personal gain/ monetary gain, the Contractor shall compensate the Owner/Project Manager for the loss suffered as well as for the value of gain derived by the third party. The Contractor shall not use the confidential details of the Contract for any other purpose except for the strict purpose intended under the Contract.

1.13 **Contract Co-ordination and Interface**

1.13.1 From fiscal and execution considerations, the Owner/Project Manager may enter into independent stand-alone contracts with one or more Other Contractors for the other packages at the same premises.

1.13.2 The Contractor, shall be responsible for effective coordination and interfacing of all his contracting activities and obligations under the Contract with the activities and obligations of the Other Contractors and Related Works contractors in a seamless manner, irrespective of whether the same is specifically detailed in such Contracts, to ensure that the Guaranteed Time Schedule and Performance Guarantees set forth in the Contracts are properly fulfilled in a timely manner by all such Other Contractors.

1.13.3 It is the responsibility of the Contractor to interface, coordinate and cooperate with Other Contractors. Contractor shall share all information & details about the Works which are reasonably required by Other Contractors to perform works under their respective Contracts or to integrate the Works with Other Contractors' works if so required.

1.14 **Assignment**

1.14.1 The whole of the works included in the Contract shall be executed by the Contractor and the Contractor shall not directly or indirectly transfer, assign, sub-contract or sublet the Contract or

any part, share or interest therein nor shall he take a new partner without the written consent of the Owner/Project Manager. Without prejudice to the above, it is agreed that sub-contracting of all or part of its obligations under this Contract shall not relieve the Contractor from the full and entire responsibility of the Contract (including such obligations thereunder that have been sub-contracted) or from active superintendence of the works during their progress. There shall not be any change in Control of the Contractor without the prior written consent of the Owner / Project Manager.

1.14.2 If the Contractor shall cause any part of the work to be performed by the approved Sub-contractor, the provisions of this Contract shall apply to such Sub- Contractor and his or its officers, agents or employees in all respects as if they were employees of the Contractor, and the Contractor shall not in any manner thereby, be discharged from his obligations and liability hereunder, but shall be liable hereunder for all acts and negligence of his Sub- Contractor, Sub-contractor's officers, agents and employees, as if they were employees of the Contractor. No sub-contract shall be made by the Contractor, without the written approval of the Owner/Project Manager, of both the sub-contract and the Sub- Contractor, but no such approval of the Owner/Project Manager, of both the sub-contract and the Sub- Contractor, shall affect the provisions hereof or serve to relieve the Contractor of any of the responsibilities and liabilities as described above. Copies of all such sub-contracts shall be furnished to the Owner/Project Manager immediately upon the execution thereof. The Owner/Project Manager may request the Contractor at any time to terminate any sub-contracting arrangement if the Owner/Project Manager is not satisfied with the performance of such Sub-contractor and immediately upon receipt of such request, the Contractor shall terminate such sub-contracting arrangements. The Contractor shall ensure that all sub-contracting arrangements entered into by the Contractor allow it to terminate such sub-contracting arrangements in accordance with the instructions of the Owner/Project Manager, as set out above.

1.15 **Relationship between Parties**

1.15.1 This Contract has been entered into by the Parties on a principal-to-principal basis only. The Contract shall not be construed as a partnership or an association of persons. The contract does not create any agency, partnership, joint venture, or other joint relationship between the Parties hereto. The Owner, the Project Manager and the Contractor are independent Parties performing their respective obligations and responsibilities as specified under this Contract. Each Party shall be responsible for its own conduct. The Contractor shall at all times ensure that all the work carried out under this Contract either by its own person or through any of its Sub-contractors shall always be done under its own direct.

1.16 **Joint & Several Liability**

If the Contractor constitutes a joint venture, consortium of entities or other unincorporated grouping of two or more persons:

a) these entities / persons forming the consortium shall be deemed to be jointly and severally liable to the Owner/Project Manager for the performance of the Contract;

b) these entities / persons forming the consortium shall notify the Owner/Project Manager of their leader who shall have the authority to bind the Contractor and each of these entities / persons; and

c) the Contractor shall not alter the composition of the consortium or legal status without the prior written consent of the Owner/Project Manager.

2.0 OWNER/PROJECT MANAGER'S OBLIGATIONS

2.1 **Access and Right to Use of the Site**

The Owner/Project Manager shall grant the Contractor right of access to and make available the Site to the Contractor in accordance with the terms of the Owner/Project Manager's property rights within reasonable time after the Letter of Intent for the performance of the Work or pursuant to and in accordance with the Contract. Such right and use of the Site may not be exclusive to the Contractor. In the execution of the Works, no persons other than the Contractor or his duly appointed representative, duly authorised Sub-contractors and workmen, shall be allowed to do Work on the Site, except by the special permission, in writing by the Owner's representative.

2.2 **Permits Licences & Approvals**

2.2.1 The Contractor shall be responsible for applying and obtaining all the Permits, licenses or approvals as required to be obtained by Contractor for carrying out and completion of the Works, in time as per the Schedule agreed in the Contract. The Owner/Project Manager may, at the request and cost of the Contractor assist the Contractor in applying for Contractor Permits and other Construction Permits as defined herein. Such requests may also include requests for the Owner/Project Manager's assistance in applying for any necessary government consent for the export of Contractor's equipment when it is removed from the Site.

2.2.2 The Owner/Project Manager's assistance in applying for Permits, licenses or approvals (for which the Contractor is responsible under the Contract) is not obligatory and the extent of such assistance shall be at the sole discretion and convenience of the Owner/Project Manager. In any case, the obligations of the Contractor as set out herein shall continue, irrespective of the manner, outcome and extent of assistance from the Owner/Project Manager. All the necessary fees and any incidental charges required to be paid for obtaining all Contract permits shall be solely borne by and be the sole liability of the Contractor, without any recourse to the Owner/Project Manager. All statutory fees paid for obtaining the Permits / licenses / approvals pertaining for execution of the Project specified in Owner/Project Manager's scope shall be reimbursed by the Owner/Project Manager against submission of documentary evidence. However, Contractor shall obtain permits / Licenses, approvals required for carrying out his responsibilities at his cost.

2.3 **Owner/Project Manager's Other Obligations**

2.3.1 Owner/Project Manager shall

a) Designate a person as Owner/Project Manager's Representative (the "Owner's Representative") to be the contact for Contractor with respect to the performance of the Works and Contractor's obligation under the Contract, and shall be authorised to act for and on behalf of Owner/Project Manager and administer this Contract on Owner/Project Manager's behalf, agree up on procedures for co-ordinating Owner/Project Manager's efforts with those of Contractor and Other Contracts and as appropriate, make information available to Contractor.

b) Pay in a timely manner in accordance with Terms of Payment, subject to fulfilment of milestones and provided the Contractor is not in breach of Contract, the Contract Price and all other sums, if any, required to be paid by it to Contractor pursuant to the Contract.

2.4 **The Owner's Representative**

2.4.1 **The Owner's representative's Duties and Authority**

The Owner may appoint separate consultant/s to provide project management consultancy services for the Project. Such consultant/s shall act as an Owner's Representative to exercise the rights and carry out the duties of the Owner under the Contract. Owner's Representative shall

also include Consultant / Consulting Engineer or Third-Party Inspection Agency as required or deemed appropriate or authorised by the Owner/Project Manager. Any act, instruction or decision of the Owner's representative shall be as if this was an act, instruction or decision of the Owner.

The Contractor shall not be authorized to receive or act on instructions from any person other than the authorised Owner's Representative without prior written consent of the Owner and the Contractor shall be solely & entirely liable for the act of omission carried out under the instructions from any person other than the Owner or Owner's Representative.

Except as expressly stated in the Contract, the Owner's Representative shall have no authority to (a) amend, alter, modify or waive any provision or term of the Contract, or (b) relieve the Contractor of any of his duties, obligations or responsibilities under the Contract. Any proposal, inspection, examination, testing, consent, approval or similar act by the Owner's Representative (including absence or disapproval) shall not relieve or absolve in any manner whatsoever, the Contractor from any responsibility, liability or obligation under the Contract, including responsibility and liability for his errors, omissions, discrepancies, and non-compliance with the Specifications and any provisions of the Contract.

2.4.2 **Owner's Representative's instructions**

2.4.3 The Contractor shall comply with written decision instruction or order given by the Owner's Representatives (such as have been identified in writing by the Owner) in accordance with the Contract. The Contractor shall not be authorised to receive instructions from any other Person without the prior written consent of the Owner and the Contractor shall be solely and entirely liable for any acts or omissions carried out under instructions from any Person other than the Owner or a duly authorised Owner's Representative.

3.0 SCOPE OF CONTRACT

3.1 General

3.1.1 The Contractor shall carry out and complete the Works in every respect in accordance with this Contract and in accordance with the directions and to the satisfaction of the Owner/Project Manager. The Owner/Project Manager may at his absolute discretion from time-to-time issue further drawings and/or written instructions, details, directions and explanations which are hereafter collectively referred to as " Owner/Project Manager's Instructions" in regard to:

a) The variation or modification of the design, quality or quantity of works or the omission or substitution of any work.

b) Any discrepancy in the drawings or between the Schedule of Quantities and/or drawings and/or specification.

c) The removal from the site of any materials brought thereon by the Contractor and the substitution of any other materials thereof.

d) The removal and/or re-execution of any works executed by the Contractor.

e) The dismissal from the works of any persons employed thereupon.

f) The opening up for inspection of any work covered up.

3.1.2 The Contractor shall forthwith comply with and duly execute any work comprised in such Owner/Project Manager's Instructions provided always that verbal instructions, directions and explanations given to the Contractor or his Superintendent upon the Works by the Owner/Project

Manager shall, if involving a variation, be confirmed in writing by the Contractor within seven days and the Owner/Project Manager's written approval obtained. Rates of items not mentioned in the Schedule of Quantities and Rates shall be dealt with as extra items.

3.1.3 If compliance with the Owner/Project Manager's Instructions as aforesaid involves work beyond that contemplated by the Contract, then unless the same were issued owing to some breach of this Contract by the Contractor, the Owner/Project Manager shall pay to the Contractor the prices of the said work as an extra to be valued as hereinafter provided.

3.1.4 The Contractor shall be deemed to have scrutinised the correctness and completeness of the obligations and requirements as specified in the Tender Documents (including design criteria and calculations, if any). The Contractor shall be responsible for the design of the Works. The Owner/Project Manager shall not be responsible for any error, inaccuracy or omission of any manner in the Tender Documents as originally included in the Contract and shall not be deemed to have given any representation of accuracy or completeness of any data or information. Any issue (including and not limited to error, accuracy, completeness) with the data or information received by the Contractor, from the Owner/Project Manager or otherwise, shall not relieve the Contractor from his responsibility for the design and execution of the Works.

3.1.5 **Free Issue Materials / Equipment (FIM) (as applicable provided FIM is specified in SCC / Technical Specifications) to the Contractor by the Owner/Project Manager:**

If the Contract involves or the Owner/Project Manager & the Contractor mutually agree for the incorporation of any free issue materials / equipment by the Owner/Project Manager depending upon criticality & availability of the materials during the course of the Contract:

a) Not used

b) The Contractor shall inspect the free issue materials / equipment at the time of taking delivery thereof and satisfy itself of the quality, quantity and condition of the free issue materials / equipment. The Owner/Project Manager shall not be liable for any claims or complaints whatsoever in respect of the quality, quantity or condition of the Free issue materials / equipment once the Contractor has taken delivery thereof.

c) All free issue materials / equipment shall be taken delivery of, transported, held, stored and utilized by the Contractor as trustee of the Owner/Project Manager, and delivery of the Free Issue Material to the Contractor shall constitute an entrustment thereof by the Owner/Project Manager to the Contractor with the intent that any transportation, utilization, application or disposal thereof by the Contractor otherwise than for incorporation in the Indigenous Material(s) shall constitute a breach by the Contractor.

d) The Contractor shall transport the Free Issue Materials / equipment only by such transportation as is suitable and shall hold and store the Free issue materials / equipment only at such place and/or premises that are air and water tight and otherwise suitable for the storage of the Free issue materials / equipment so as to prevent damage or deterioration or theft or other loss, and shall arrange such watch and ward as shall be necessary to ensure the safety thereof. The Contractor shall exercise the at least the same level of care and diligence in respect of the use, storage, transportation or safety of the free issue materials / equipment that it exercises in respect of its own materials / equipment.

e) Notwithstanding the Bank Guarantee mentioned in sub-paragraph (a) above, the Contractor shall replace any Free issue materials / equipment which is/are lost, damaged, misused, stolen or deteriorated with other Material(s) of equivalent quantity and quality and condition, and the same shall be deemed to constitute Free issue materials / equipment and the provisions of sub-paragraphs (a) to (f) hereof shall apply

thereto in the same manner as to the originally supplied Free issue materials / equipment.

f) Unused Material(s) from the Free issue materials / equipment shall be returned by the Contractor to the Owner/Project Manager and if the Owner/Project Manager so directs, the Contractor shall dispose of the same by sale or otherwise on such terms and conditions as the Owner/Project Manager may stipulate or approve and the Contractor shall pay to the Owner/Project Manager the sale proceeds of the Material(s) so disposed of by sale.

g) Contractor shall ensure quarterly physical assessment of the stock of material issued to him by the Owner/Project Manager and submit the same in the form of Reconciliation.

h) The free issue materials will be supplied by the Owner in bags, sizes and lengths or in coils as available. The cost of all wastage, due to rolling tolerance, cutting, conversion, straightening and/or fabricating shall be borne by the Contractor, at the recovery rates given in item No (i) below, as long as wastage margin does not exceed following limits:

i) Cement at 2% - Reconciliation of cement shall be done as per standard practice as per relevant IS code and any wastage above 2% shall be recovered from the Contractor at the rate mentioned in item no (i) of clause 3.1.5 stated below.

ii) Structural steel at 3% of the theoretical requirements – 2.5 % is considered as visible wastage and 0.5 % as invisible wastage like gas cutting etc. Rolling tolerance if any shall be recorded separately and due credit or consideration shall be given during reconciliation. All scraps shall be the property of Owner. The scraps shall be properly accounted for and no scrap or cut pieces shall be removed from site or disposed off without prior inspection and written permission by the Engineer. All scraps are deemed to be included within the above allowances. The following dimensions shall be considered for reconciliation purposes:

a) Structural sections less than 75 mm in any dimension - 1.2 meters and above

b) Structural sections exceeding 75 mm in any dimension-2.0 meters and above

c) Plates-Up to 12mm thickness - 200mm x 200mm and above

d) Plates- 14mm to 25 mm thickness-300mm x 300 mm and above

e) Plates- 25mm thickness – 400mm x 400mm and above

Provided further, if the Engineer so desires, the Contractor shall have to return to the Owner cut pieces or scrap even below the dimension stated above. Due credit will be given for such return at rates to be fixed by the Engineer.

iii) Reinforcement steel at 3% of the theoretical requirements – 2.5 % is considered as visible wastage and 0.5% as invisible wastage like cutting etc. Rolling tolerance if any shall be recorded separately and due credit or consideration shall be given during reconciliation. All scraps shall be the property of Owner. The scraps shall be properly accounted for and no scrap or cut pieces shall be removed from site or disposed of without prior inspection and written permission by the Engineer. All scraps are deemed to be included within the above allowances. The following dimensions shall be considered for reconciliation purposes:

a) Reinforcement Steel Up to 16mm diameter – 2 meters and above

b) Reinforcement Steel above 16mm diameter – 3 meters and above

Provided further, if the Engineer so desires, the Contractor shall have to return to the Owner cut pieces or scrap even below the dimension stated above. Due credit will be given for such return at rates to be fixed by the Engineer.

i) Recovery for unaccountable wastages, i.e. in excess of limits stated as above or for the material that is not reconciled, shall be made from the Contractor at prevailing market rate plus 25 %. The Owner/Project Manager shall decide the quantities of materials for which such value is to be recovered and decision of the Owner/Engineer shall be final and binding.

3.2 **Labour and Personnel**

3.2.1 The Contractor shall make his own arrangements for the engagement of all staff and labour, local or otherwise, and for their payment, housing, food and transport. Any labour camps required for execution of Works shall be arranged by Contractor at its own cost. No parcel of land or other facilities shall be provided by the Owner/Project Manager.

Contractor shall provide all labour and personnel required in connection with work, including:

a) Professional engineers licensed in accordance with any applicable licensing requirements in India or by any other governmental instrumentality to perform engineering services pursuant to the Contract.

b) Project team of necessary engineers from various disciplines including, construction manager, Project engineer and civil, mechanical, electrical, instrumentation and control, costing, scheduling, procurement, construction, start-up and training supervisors, all of whom shall follow Good Engineering Practices and shall have had extensive experience in projects of similar nature and magnitude and shall be proficient in the English language and have knowledge of standard industry Practices, Applicable Laws and Applicable Permits.

c) A Project Coordinator or other Representative, who shall be fully acquainted with the Project, shall be proficient in the English language and shall have the authority to administer this Agreement on behalf of Contractor. He shall give his whole time to the construction, erection and execution of the Works and to directing the preparation of all documents required for the same. Except as otherwise stated in the Contract, the Contractor's Representative shall receive (on behalf of the Contractor) all notices, instructions, consents, approvals, certificates, determinations and other communications under the Contract. Whenever the Contractor's Representative is to be absent from the site, a suitable replacement person shall be appointed, and the Owner/Project Manager / Owner's Representative shall be notified accordingly.

d) Quality assurance & Safety personnel, all of whom shall report directly to Contractor's designated home office managers and not to the Project personnel located at the Site.

e) Contractor shall give first preference for suitable skilled/unskilled local labours who have been affected due to implementation of this Project.

The Contractor shall employ (or cause to be employed) only persons who are careful and appropriately qualified, skilled and experienced in their respective trades or occupations.

The Contractor shall not solicit, recruit, or attempt to recruit, staff and labour from amongst the Owner / Project Manager or Other Contractor personnel during the term of the Contract.

Upon Owner/Project Manager's request, Contractor shall provide Owner/Project Manager with the resumes of, and arrange for the interview by Owner/Project Manager of, any or all personnel described in clauses (a), (b), (c) & (d) of this Section 3.2.1. In addition, Owner/Project Manager will have the right to approve those individuals who will hold the positions described in clauses (a), (b), (c) and (d) of this Section 3.2.1 and any other key

Project personnel employed by Contractor, and Owner/Project Manager will be afforded the opportunity to choose among candidates for the positions of project manager, project engineer and construction manager. Contractor shall not remove any Project personnel described in clauses (a), (b) & (c) and (d), of this Section 3.2.1 or any other individual in a supervisory or lead position without the prior consent of Owner/Project Manager, which consent shall not be unreasonably withheld.

3.2.2 **Removal of Staff and Labour**

The Owner/Project Manager / Owner's Representative may require the Contractor by notice in Writing to remove (or cause to be removed) any person employed on the Site or Works, including the Contractor's Representative, who in the opinion of the Owner/Project Manager / Owner's Representative:

a) Persists in any misconduct,

b) Is incompetent or negligent in the performance of his duties,

c) Fails to conform with any provisions of the Contract;

d) Persists in any conduct which is prejudicial to safety, health, or the protection of the environment; or

e) Is found to be in intoxicated condition at the Site

f) Any other good and sufficient reasons which could be detrimental to safe and smooth operation of site as solely determined by the Owner/Project Manager or their Representatives.

3.2.3 **Rates of Wages and Conditions of Labour**

Contractor shall ensure that he pays all his personnel and shall ensure and procure that his Sub-contractors pay to their personnel regularly their wages, overtime and other compensations. The attendance register and the wage register shall be submitted to the Owner/Project Manager for verification at regular intervals. The Contractor shall also furnish the Owner/Project Manager at regular intervals as governed by Applicable Laws including local statutes but not less than Monthly intervals, certificates that he has paid to his Sub-contractors and workmen and caused his Sub_Contractors to pay all the dues to his Sub-contractor workmen. In case such payment is not made regularly by the Contractor or his Sub-contractors, the Owner/Project Manager will be in his right to make such payments and deduct the same from the Contractor's progress payments. In case the Owner/Project Manager 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's Compensation Act or any other Applicable law due to act or omission of the Contractor, the Owner/Project Manager may make such payments and shall recover the same from the Contractor's bills. No labourer below the age of eighteen years shall be employed in the Work.

No price adjustment shall be made on account of changes in minimum wages during contract period including extension period if any.

Any personnel engaged by the Contractor in accordance with and in pursuance of this Contract shall be the direct employee of either the Contractor or Sub-contractors. The Contractor shall be solely liable for and responsible to all such personnel. The Owner shall have no responsibility towards any such personnel and such personnel shall, in no event, be deemed to be the employees of the Owner. Also, the Owner shall have no responsibility towards any Sub-contractor or its personnel and such Sub-contractor or its personnel shall, in no event, be deemed to be the Sub-contractor of the Owner.

3.2.4 **Persons in the Service of Others**

The Contractor or any of its Sub-contractors shall not recruit, solicit or attempt to recruit, its staff and labour from amongst persons in the service of the Owner/Project Manager or Other Contractors and agencies engaged by the Owner/Project Manager or the Owner's Representative during the term of contract and for a period of 1 year following completion or termination of the Contract.

3.2.5 **Labour Laws**

3.2.5.1 Any personnel engaged by the Contractor in accordance with and in pursuance of this Contract shall be the employees / Sub-contractors of the Contractor and the Contractor shall be solely liable for and responsible to such personnel. The Owner/Project Manager shall have no responsibility towards any such personnel and such personnel shall, in no event, be deemed to be the employees or Sub-contractors of the Owner. The Contractor shall comply with and shall ensure that he/his Sub-contractors comply with all the relevant labour laws applicable to his/his Sub-contractors' employees and shall duly pay and afford and cause his Sub-contractors to pay and afford to them all their legal rights. The Contractor shall require all such employees to obey all Applicable Laws and regulations concerning safety at Work.

The Contractor shall be responsible for all labour relation matters relating to the Work and shall at all times use its best efforts to maintain harmony among the personnel employed in connection with the Work whether by the Contractor or his Sub-contractors and shall enter into all necessary labour agreements with such personnel. Contractor and his Sub-contractors shall at all times comply with all Applicable Permits and Applicable Laws relating to employment including but not limited to Contract labour regulations, Workmen Compensation Act, Employee State Insurance and Provident Fund regulations, retrenchment Compensation etc. and labour welfare and use its best efforts and judgement as an experienced Contractor to adopt and implement policies and practices to avoid Work stoppages, slowdowns, disputes, strikes, lockouts and other labour strife and disagreement.

3.2.5.2 The Contractor shall be fully responsible for the due compliance by him and his Sub-contractors with all statutory requirements and with all applicable labour laws including Contract Labour Abolition and Regulation Act, Workmen's Compensation Act, P.F./E.S.I., Labour welfare fund, Act, etc. as may be applicable to the Contractor, the Sub-contractors and their employees. The locations where Allied Manpower Management System (On-line system) has been implemented, the Contractor shall ensure necessary declarations and documents are provided in the system, as per the role of the Contractor envisaged in the system.

The Contractor should get in touch with the local HR/IR/ES&A teams for completion of Statutory compliances before start of the Work. The Contractor should also ensure that he provides correct and complete PF compliance data for a wage month in the format provided by the HR/IR/ES&A teams on or before 15th of the subsequent month, failing which penalty of 1% of the value of the Invoice, per day of delay would be deducted from the Invoice raised. Further, the management will also have a right to suspend the work in case of delay in submitting the PF data.

All other compliances required by HR/IR/ES&A teams should also be provided as per timelines.

The Contractor shall fully indemnify and save harmless the Owner from and against all claims, demands, expenses, losses, liabilities, charges, actions, suits and proceedings whatsoever including claims under aforesaid Acts and laws which may be brought or made against the Owner, its Officers or servants by reason or in consequence of any matter or thing done or omitted or delaying the submission of data by the Contractor and/ or its Sub-contractors and all costs, charges and expenses which may become payable by the Owner in respect thereof."

3.2.5.3 Child labour is strictly prohibited. Contractor shall not engage any labour or employ any personnel below 18 (eighteen) years of age.

3.2.6 **Working Hours**

No work shall be carried out on the Site outside the normal working hours or on the locally recognised Days of rest or local festivals / holidays, unless:

a) Contract so provides after fulfilling Owner / Project Manager's process and procedures for the said working,

b) Work is unavoidable, or necessary for the saving of life or property or for the safety of the Works, in which case the Contractor shall immediately advise the Owner/Project Manager/Owner's Representative,

c) Owner/Project Manager/Owner's Representative gives his consent,

d) Extended working hours/shift working is essential for achieving Project progress/milestones at no extra cost to the Owner/Project Manager.

e) The Contractor is normally expected to work during daytime and is required to complete the work in all respects as stipulated elsewhere. For achieving Project progress/milestones, based on a specific request by the Contractor, Owner/Project Manager/Owner's Representative may consider granting permission for working during the night shifts, if he considers it essential with no extra cost to the Owner/Project Manager. Night work to be carried out only after obtaining necessary clearances and approval of the Owner/Project Manager's Representative.

Sufficient lights shall be provided by the Contractor to safeguard the workmen and the public and to afford adequate facilities for properly placing and inspecting the material when the night work is in progress. Contractor should be geared and in readiness to carry out extended shifts, including night shift and abide by all statutory and safety requirements in respect thereof.

3.2.7 **Facilities for Staff and Labour**

The Contractor shall provide and maintain all necessary accommodation and welfare facilities for his (and his Sub-contractor's) staff and labour. The Contractor shall also provide the facilities specified in the Contract including specifications, for the Owner/Project Manager's and Owner's Representative's personnel. The Contractor shall not permit any of his or his Sub-contractor's employees to maintain any temporary or permanent living quarters within the structures forming part of the Works or Project Site. Contractor shall make his own arrangements to procure and construct adequate labour housing outside the Project Site and colony battery limits. No areas inside the Owner's land and Project Site shall be used as labour colony. No workers/labourers/supervisors or other Contractor's or Sub-contractor's personnel should be allowed to stay within the Owner's land area after his duty hours. Similarly, no workers/labourers/ supervisors or other Contractor's or Sub-contractor's personnel shall be allowed to enter the Owner's land area before the start of their respective duty time.

3.2.8 **Health and Safety Precautions**

Precautions shall be taken by the Contractor to ensure the health and safety of his and his Sub-contractor's staff and labour. The Contractor shall, in collaboration with and according to the requirements of the local health authorities, ensure that medical staff, first aid facilities, sick bay and ambulance service are available at the accommodation and on the site at all times, and that suitable arrangements are made for all necessary welfare and hygiene requirements and for the prevention of epidemics. The Contractor shall maintain records and make reports concerning health, safety and welfare of Persons, and damage to property, as the Owner's Representative

may reasonably require. Contractor shall be responsible for the medical treatment/hospitalisation of his and his Sub-contractor's staff / labour.

Although the Contractor is responsible and expected to arrange for the first-aid treatment, the Owner/Project Manager may provide first-aid treatment to Contractor's employees as a humanitarian service, post which, the Contractor shall assume full and complete responsibility & liability for all the injuries and damages to its employees/workers/staff/personnel arising out of or allegedly attributable to such first aid. The Contractor shall indemnify and save harmless the Owner/Project Manager against any losses or damages or claims arising out of such first aid treatment or otherwise provided to any of the Contractor employees/workers/staff/personnel.

The Contractor shall appoint a member of his staff at the site to be responsible for maintaining the safety, and protection against accidents, of all personnel on the site. The Contractor shall pay particular attention to ensure safety of his staff and workmen and other persons in the vicinity of the Site and shall be responsible for any loss of life or injury to person due to negligence or any other causes whatsoever except natural causes. He shall provide all necessary fencing and lights required to prevent accidents and shall be bound to bear the expenses of defence of every suit, action or other proceedings at law that may be brought by any person for injury sustained owing to neglect of the above precautions and to pay any damages and costs which may be awarded in any such suit, action or proceedings to any such person or which may with consent of the Contractor be paid to compromise any claim of any such person. Contractor shall comply with the Owner's/Project Manager's Safety Terms & Conditions, Health Safety & Environment Manual with sustainability document which is annexed to the GCC.

Without prejudice to the other provisions contained herein, the Contractor agrees to reinstate all damage of every sort mentioned in this clause so as to deliver the whole of the Contract Works complete and perfect in every respect and so as to make good or otherwise satisfy all claims for damage to the property of third parties.

The Contractor shall take all precautions necessary and shall be responsible for the safety of the work and shall maintain all lights, guards, sign boards, temporary passages, or other protection necessary for the purpose. All work shall be done at the Contractor's risk, and if any loss or damage shall result for fire or from other cause, the Contractor shall promptly repair or replace such loss or damage free from all expenses to the Owner/Project Manager. The Contractor shall be responsible for any loss or damage to material, tools or other articles used or held for use in connection with the work. The work shall be carried on to completion without damage to any work or property of the Owner/Project Manager or of others and without interference with the operation of existing machinery or equipment.

The use of explosives in a manner, which might disturb or endanger the stability, safety, or quality of the works, will not be allowed. Explosives shall be stored, handled and used as prescribed by the law and regulation of the Indian Union, the State in which the work is performed and sub-divisions thereof. Special attention must be given to immediate disposal of paper wrappings from explosives, which are poisonous to livestock.

Technical and safety evaluation of Contractor's Sub-contractor shall be done jointly by Owner/Project Manager.

3.2.9 **Contractor's Superintendence**

The Contractor shall provide all necessary superintendence during the construction, erection and execution of the Works, and as long thereafter as the Owner's Representative may consider necessary for the proper fulfilling of the Contractor's obligations under the Contract. Such superintendence shall be given by the sufficient persons having adequate knowledge of the operations to be carried out (including the methods and techniques required, the hazards likely

to be encountered and methods of preventing accidents) for the satisfactory and safe execution of the Works.

3.3 **Permitting**

3.3.1 **Contractor and Construction Permits**

Contractor shall obtain and maintain, all necessary permits required for the performance of its obligations hereunder, including those required for construction related activities and shall at all times, comply with all the terms and conditions as may be specified in such permits. If Contractor at any time becomes aware, whether as a result of notice from Owner/Project Manager or otherwise, of any applicable permit not obtained by him, Contractor shall promptly give notice thereof to Owner/Project Manager and Contractor shall be responsible for obtaining such Applicable Permit.

The Contractor shall fully indemnify and hold harmless the Owner/Project Manager and all the Owner/Project Manager and their respective shareholders, directors, employees and officials from any losses or damages arising from and out of the Contractor's failure to secure such permits or comply with any terms and conditions stated therein.

3.3.2 **Support to Owner/Project Manager for Permits**

In case Owner/Project Manager is responsible for the permits, Contractor shall provide support to Owner/Project Manager in obtaining all Owner/Project Manager Permits. Such Contractor support shall include:

a) Attendance at meetings with Owner/Project Manager and third parties designated by Owner/Project Manager;

b) Assistance in Preparation of Permit applications or, as applicable, application to transfer permits to the Owner/Project Manager;

c) Assistance in preparation of responses to inquiries by Governmental Instrumentalities / agencies;

d) Assistance in presentations at hearing of Governmental Instrumentalities / agencies, and

e) Provision of all available information and Documents required by Owner/Project Manager in connection with obtaining any Owner/Project Manager Permits;

3.4 **Co-operation**

3.4.1 The Contractor shall, as specified in the Specification, afford all reasonable opportunities for carrying out their respective Work to:

a) Any other contractors employed by the Owner/Project Manager and their workmen,

b) The personnel of the Owner/Project Manager, and

c) The personnel of any legally constituted public authorities who may be employed in the execution on or near the site of any work not included in the Contract, which the Owner/Project Manager may require to complete the Project.

3.4.2 The Contractor shall not hinder the work of Other Contractors and other sub-contractors of Owner/Project Manager, if any employed by or on behalf of Owner/Project Manager at the Plant Site or the Project Site, to introduce and store Materials in those areas of the Plant Site and the Project Site under Owner/Project Manager's direct control and shall cooperate to help them perform their respective services without hindrance or disruption. The Contractor shall also acknowledge that he works in congruence with requirements of lenders, other contractors,

Project off takers and other related parties, and provide them appropriate information as and when required by them and not act as to harm the interests of any of them.

3.4.3 **Miscellaneous Liabilities in Co-operation with Other Contractors**

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 their workmen.

Any injury or damage that may be sustained by the employees of the Other Contractors or the Owner/Project Manager, or damage to the works of Owner/Project Manager and/or other contractors due to the Contractor's Work shall promptly be made good at contractor's expense.

The Owner's representative 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/Project Manager in regard to their work.

If the Works of the Contractor is delayed because of any acts or omission of another Contractor, the Contractor shall promptly, however not later than 7 (seven) days from the occurrence of the event, expressly notify in writing to the Owner / Project Manager of such acts of omissions on part of Other Contractors. The Contractor shall have no claim against the Owner/Project Manager on this account other than an extension of time for completing his Works, provided the cumulative effect of such delays does not exceed 60 (sixty) Days. If such delays exceed 60 (sixty) Days, the financial and time implications, if any, shall be mutually discussed, provided that the Contractor had notified the Owner/Project Manager of such acts or omissions of the Other Contractor immediately upon the occurrence thereof. No claim shall be entertained by or against the Owner/Project Manager in the instance the Contractor fails to notify such event within the stipulated time stated above.

The Owner's Representative shall be notified by the Contractor promptly of any defects or delays in the Other Contractor's Works that could affect the Contractor's Works. The Owner's Representative shall determine the corrective measures if any, required to rectify this situation after inspection of the Works and such decisions by the Owner's Representative shall be binding on the Contractor.

The Contractor shall deploy all necessary effective manpower for coordination, expediting and construction supervision required for completion of the works to meet the stipulated quality standards & Project Schedule. In case of deficient performance of the Contractor in this regard is observed by the Owner / Project Manager, the same shall be brought out to the notice of the Contractor in writing. In case Contractor fails to remedy the performance, Owner/Project Manager will rectify the same by deployment of his own resources and the cost of the same shall be recovered from the Contractor, whether by set off against amounts payable to the Contractor under the Contract or directly, to be decided at the sole discretion of the Owner.

Should the works be suspended by reason of strike/riots by Contractor's own employees or any other cause whatsoever which relates solely to the Contractor or the Contractor's Sub-contractors and/or their respective employees and personnel Contractor shall take all precautions necessary for the protection of work and make good, at his expense, any damage arising from any of these causes and shall indemnify the Owner for any delays arising on account thereof.

3.5 **Construction Facilities, Construction Power, Construction Water Facilities, Sanitary Facilities, Telecommunication Facilities, Mail Service, Catering, Start-up Spares and Consumables**

3.5.1 During the Contract Period, the Contractor shall arrange and pay for construction fuel necessary for the performance of the Work. Contractor shall arrange and pay for lubricants, chemicals, and

other consumables in sufficient quantities, and the disposal of sewage and Other Contractor and Sub-contractor generated wastes, as necessary, to enable Contractor and each Sub-contractor to perform the Work until Take-over of the Works.

3.5.2 **Construction Power Supplies**

Unless specifically agreed by the Owner otherwise, the Contractor shall arrange and pay for Construction Power necessary for the performance of the Work till the Take-over of the Relevant Package. Construction power if arranged by the Owner may be made available at the proposed Site as available within the plant boundary at one point and the Contractor shall make his own arrangements for further distribution & metering. The Contractor shall be responsible for the maintenance of its distribution system. The Contractor shall be responsible for payment of energy bills at prevailing/agreed rates of such Construction Power till issue of Certificate of Final Acceptance. The Construction Power system by its design and nature shall be a temporary system and not part of the permanent power supply.

Contractor shall be responsible for making its own assessment of the quantum of Construction Power required and shall furnish the information in accordance with Technical Specifications. The Contractor acknowledges that electricity sourced from an Electricity Distribution Licensee in that area through the Owner's network / DISCOM may be subject to disturbances, and its interruption or non-availability for any reason shall not constitute a condition for claim of extra time or costs on part of Contractor. The Contractor shall make adequate provision for D.G. sets as a stand-by power source for all the activities/process, which requires uninterrupted power.

No variation in Contract Price and no extension of time shall be admissible on account of any non-availability / non-reliability of Construction Power whether supplied by the Owner or arranged by the Contractor.

3.5.3 **Construction and Drinking Water Facilities**

The Contractor shall be responsible for procuring water required for construction and other performance of its obligations under the Contract. However, if feasible, construction water may be provided by Owner/Project Manager at its sole discretion on a chargeable basis at a single location within battery limit. Metering and further distribution to various consumption points will be done by Contractor at its own cost.

Cost of all connected Works such as, but not limited to, pumps, pipeline, ground water reservoir etc are to be borne by the Contractor.

If required by the Owner/Project Manager, the Contractor will provide water supply and where required potable water also to the Owner/Project Manager's facilities at the Project Site and the Owner/Project Manager shall pay for the same accordingly. If construction water is provided by the Owner/Project Manager, the same will be provided at one point within plant boundary on chargeable basis. Metering and further distribution will be provided by the Contractor at his cost.

Drinking water shall be provided by Contractor for its Employees/Workmen at its own cost.

No variation in Contract Price and no extension of time shall be admissible on account of any non-availability of Construction Water whether supplied by the Owner or arranged by the Contractor.

3.5.4 **Sanitary Facilities**

Adequate sanitary facilities for the use of persons employed by the Contractor at the construction Site shall be provided and maintained by the Contractor to the extent and in such manner and at such places as shall be acceptable to the Owner/Project Manager. Separate Toilet facilities for both gents and ladies shall be provided.

Contractor shall make all temporary arrangements for the treatment and discharge of sewage and drainage from or in connection with the construction and Work Site and shall maintain the same to the satisfaction of the Owner/Project Manager as long as they may be required. All sanitary waste shall be treated in accordance with the Applicable law including applicable local regulations.

In this regard, Contractor shall prohibit the committing of nuisance on the site or upon the land of the Owner/Project Manager or of adjacent landowners and any employee of Contractors or its Sub-contractors found violating this provision shall be liable to immediate dismissal.

3.5.5 **Canteen Facilities**

The Contractor shall arrange for catering services for their staff and workers deployed on the project Site. Costs of catering services towards the Owner/Project Manager/ Owner's Representative's Site staff would be borne by the Owner/Project Manager / Owner's Representative if services are availed.

3.5.6 **Mail Service**

A central mailing office shall be established and manned by the Contractor on the site where personal and business mail may be collected and delivered.

3.6 **Access: Office Accommodations**

Contractor shall provide Owner/Project Manager and its engineers (including the Owner/Project Manager / Owner's Representative and the Financing Parties) with reasonable access to Contractor's home office and Contractor's offices at the Site and at all design, engineering, fabrication, construction and other premises of Contractor and its Sub-contractors where activities relating to Works is carried on at all times upon reasonable prior notice, including access to design, engineering, fabrication, and testing, construction facilities, Drawings, Documents sufficient to permit Owner/Project Manager/Owner's representatives to inspect Work being performed and to monitor compliance by Contractor and the Sub-contractors with the terms of the Contract and directions of Contractor.

Contractor shall provide to Owner/Project Manager/ Owner's representatives as and when required appropriate office facility at the home office of Contractor.

3.7 **Clean-Up and Waste Disposal**

3.7.1 The Contractor shall be responsible for keeping the entire area allocated to him clean and free from accumulation of waste Materials, rubbish/debris/etc. at all times during the period of Contract.

The Contractor shall employ enough number of specialised personnel to thoroughly clean his Work area at least once a Day and dispose of the rubbish. All such rubbish and scrap material shall be scrapped or disposed in a place to be identified by the Owner's Representative.

Materials and stores shall be so arranged as 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 flame resistant, oil proof sheet shall be provided to protect the floor from such damage. Also, spillage of oil and its soaking into soil shall be prevented. In case garbage are found disposed in areas other than allotted to the contractor, then the same shall be cleared by the Owner/Project Manager and the charges debited to the concerned Contractor.

Contractor's labour camp and housing colony shall be maintained to the good standards of hygiene and shall be kept reasonably free of debris, litter and mal odour.

Similarly the labour colony, offices and residential areas of Contractor's employees and workmen shall be kept clean and neat to the entire satisfaction of the Owner's Representative. Proper sanitary arrangements shall be provided by the Contractor in the Work areas, office and residential areas of the Contractor.

The Contractor shall cause all Sub-contractors, at all times to keep the Site reasonably clean and otherwise free from accumulation of waste materials, rubbish, other debris resulting from performance of the Work. In case Owner/Project Manager is not satisfied regarding Contractor's or its Sub-contractor's cleanliness at Site, Owner/Project Manager will notify regarding the same to the Contractor. In case of non-improvement / satisfaction, Owner/Project Manager will get the site cleaned and the charges of the same will be debited to Contractor's account / deducted from Contractor's dues / payments.

3.7.2 All soil, filth or other matter of an offensive nature taken out of any excavation, trench, sewer, drain, cesspool etc shall not be deposited on the surface, but shall at once be carted away by the Contractor to some pit or place suitably arranged by him away from the site of work and approved by local authorities.

3.7.3 As a part of the work included in this Contract, the Contractor shall completely remove and satisfactorily dispose of all temporary works to the extent directed. He shall tear down and dispose off all temporary buildings, shall remove or grade, to the extent directed, all embankments or coffer dams made for construction purposes shall remove all plant and equipment, shall satisfactorily dispose of all rubbish resulting from the operations under this Contract and shall do all work necessary to restore the territory embraced within the site of his operations to at least as good order and conditions as at the beginning of the work under this Contract.

3.7.4 The Contractor shall comply with the all the statutes / guidelines of Ministry of Environment & Climate Change (MoEF&CC), Central Pollution Control Board (CPCB), State Pollution Control Board (SPCB), local municipal / panchayat authorities including the Solid Waste Management Notification dated 29th March 2016 (published in Gazette of India, Part II, Section 3, Subsection (ii)) by MoEF&CC and any further latest notifications thereon at its own cost.

3.8 **Reporting Requirements**

3.8.1 Contractor shall deliver to Owner/Project Manager/ Owner's Representative a computer-based PERT / Network Schedule in hard copy as well as a soft of Primavera (XER format) / any other mutually agreed electronic format during the Kick-off Meeting in accordance with the Contract.

3.8.2 Progress scheduling report shall be provided by the Contractor to the Owner/Project Manager in accordance with the Contract including, but not limited to, requirements indicated in the Specification. Contractor shall be responsible for,

a) Ensuring that performance of the Work proceeds in accordance with the network Schedule and

b) Co-ordinating the activities of all Sub-contractors.

Contractor to have / arrange Video Conferencing facility at his HO & manufacturing plants and Project Site for Project status reviews / discussions.

Contractor and his Sub-contractors will comply & follow the online document management systems requirements of the Owner / Project Manager.

3.8.3 **Daily Diary and Progress Reports**

A daily diary register will be kept in the Owner/Project Manager's office. The Contractor will supply all detailed information every day at 9.00 hours for the day preceding and the diary will be jointly signed by the Owner/Project Manager/ Owner's Representative and the Contractor's representatives, every day in token of its correctness. A works instruction book, serially numbered will also be kept in the Owner/Project Manager's office and all day-to-day instructions will be given in that book. The Contractor's representative shall report everyday to see these instructions and sign them at the bottom in token of his having seen them.

The Contractor shall supply all information regarding procurement of materials and progress of construction work, as is required by the Engineer for compiling the weekly progress reports. This information shall be supplied by 9.00 hours on every Monday, for the preceding week.

The Contractor shall furnish the Engineer with two levels of report (Weekly & Monthly) as per the format as approved by Owner/Project Manager.

Apart from this the Contractor is required to submit a daily report of the skilled labour and plant, equipment and other resources deployed by him at the Project Site. This shall include the resources of the Sub-contractor if any.

3.9 **Schedule**

3.9.1 Time is the essence of this contract. The Contractor shall, within one week of receipt of the Letter of Intent submit to the Owner for his approval, a detailed work schedule adhering to the timeline as stated in Special Conditions of Contract, before starting the Work to achieve completion schedule both interim and ultimate. After the Owner has agreed with the schedule, the Contractor shall prepare detailed program of each work front/activity breaking it down giving daily quantifiable/measure of progress. The schedules are to be reviewed periodically with the Owner to ensure that the completion date will be met or to institute corrective steps (at no extra cost to the Owner) to adhere to the completion dates. The Owner reserves the right to revise the schedule at his discretion in order ensure completion within the completion date and to suit the Project requirement and such alterations shall not entitle the Contractor to any extra payment. The Contractor shall provide to the Owner/Project Manager for approval within the time stated in clause 3.8.1 the programme for the execution of the contract, showing (a) the sequence and timing of activities by which the contractor proposes to carry out the work and (b) the times by which the Contractor requires the Owner/Project Manager to furnish any Owner/Project Manager's inputs as set forth in the specifications, which as and when approved shall form the Schedule.

3.9.2 Without prejudice and in addition to the foregoing the Contractor shall prepare and furnish to Owner/Project Manager updated monthly schedules of the Work to be performed, including a critical path schedule.

3.9.3 Not Used.

3.9.4 The Schedule that is updated on a Monthly basis shall be done from the basic schedules which together with the updated monthly Schedule shall be available in a computer system to which the Owner/Project Manager/Owner's Representative will have access to facilitate the Owner/Project Manager to review the various levels to independently analyse the relevant information. This, however, does not take away the responsibility of the Contractor to fulfil all his obligations under the Contract, including informing the Owner/Project Manager/Owner's Representative about the delays as also the expected delays and the actual plans to overcome such delays.

3.9.5 Contractor shall arrange for the mobilisation of all equipment, material, personnel and all other resources to progress the work at the site to suit the completion dates of the Works. No financial, time extension or other claims for idling or under-utilisation of Contractor's resources will be entertained or paid by Owner unless certified by Owner's Engineer.

3.9.6 Contractor shall identify suitable quarries for uninterrupted supply of coarse and fine aggregates and sources of all other construction materials and make necessary arrangements for transportation of the same at its own cost. If quarries and sources of other materials are located faraway, Contractor shall at all times have reserve storage of all the construction materials so as not to affect the required rate of progress.

3.10 **Taxes, Duties and Levies (As Applicable)**

Unless specifically mentioned in the Special Conditions of Contract, Contractor shall not assume any duty concessions / exemptions of any nature whatsoever and shall consider all Taxes, Duties and Levies at the full rate without any concessions while submitting the Price Bid and all Taxes, Duties and Levies shall be deemed to be included in the Contract Price at the applicable full rate without any exemption or concessions. Owner shall not be liable to provide any document for availing any exemption or concessions on Taxes, Duties and Levies.

In case the Project / Relevant Package is conceived under any special taxation scheme (e.g. Deemed Export Benefit (FTP) of Government of India / International Competitive Bidding Process / Mega Power Project / Renewable Projects etc.), the same shall be specifically stated under Special Conditions of Contract. In such cases, the Contractor shall obtain/consider all the tax exemptions as applicable under Govt. of India / State Govt. (Project Authority /Essentiality Certificate) while submitting the Price Bid.

3.10.1 **Taxes to the Contractor's Account**

i) The Contract Price as mentioned in the Schedule of Quantities mentioned elsewhere in the Contract are inclusive of applicable taxes including BOCW, CGST, SGST, IGST, Customs Duty, royalties and/or any other duty/tax levied by Central, State Governments, local bodies or other public bodies. The tax components (CGST, SGST, IGST etc.) shall be shown separately in price breakup.

ii) The agreed rates and price shall be deemed to include all materials, labour, plant & equipment and everything necessary to satisfactorily the agreed contract Works, rates shall also include for everything in the Technical Specifications & all activities/things required to complete the particular item. The rates shall be firm till the tenancy of Contract and shall not be subject to escalation on any ground whatsoever. The Contractor when called for by the Owner/Project Manager shall furnish detailed analysis in support of the rates quoted by him against each item of the Contract. The Owner/Project Manager reserves the right to utilise the analysis thus supplied in settling any deviations or claims arising out of this Contract.

iii) Except as otherwise specifically provided in the Contract irrespective of the mode of Contracting, the Contractor shall bear and pay all taxes, duties, levies, charges, interest and penalties and the like levied and /or assessed on the Contractor, its Sub-contractors, or their employees, by all municipal, local bodies, state or national government authorities or any other Government Instrumentality in connection with the Works.

iv) The Contractor, hereby agrees to indemnify and keep indemnified and saved harmless at all times the Owner/Project Manager against any loss, Cost, expenses or damages suffered or incurred by it, by reason of its failure to pay taxes, duties, etc which it is obliged to pay pursuant to the provisions of this clause and / or arising out of its failure to comply with its obligations under this clause.

v) The Owner/Project Manager shall recover from the Contractor and / or adjust from the Contract Price all taxes, duties, levies, charges, interest and penalties and the like leviable and / or assessable on the Contractor, its Sub-contractors or their employees but levied and / or assessed on the Owner/Project Manager as a representative assessee / agent of the Contractor, its Sub-contractors or their employees, by all municipal, local, state or national

government authorities or any other Government Instrumentality in connection with the Work.

vi) Further the Owner/Project Manager shall recover from the Contractor and / or adjust from the Contract Price, simple interest at State Bank of India Marginal cost of fund-based lending rate(SBI MCLR) for a tenure of 1 year from the date of payment of all taxes, duties, levies, charges, interest and penalties and the like leviable and / or assessable on the Contractor, its Sub-contractors or their employees but levied and / or assessable on the Owner/Project Manager as a representative assessee / agent of the Contractor, its Sub-contractors or their employees, by all municipal, local, state or national government authorities or any other Government Instrumentality in connection with the Work.

3.10.2 **Variation in Tax or Applicable Taxes or Introduction of New Taxes**

i) Any statutory variation in rate of applicable Indian taxes, duties, levies etc., any variation in applicable taxes or interpretation/enforcement of the same or introduction of new taxes or the introduction/amendment of any exemptions (other than Direct taxes i.e. Income Tax, corporate tax etc), levied in India, starting from 2 (two) Days prior to the Closing Date for submission of Bid but within the Guaranteed Completion Date of Works, shall be to the account of the Owner/Project Manager. Such adjustment shall be limited to direct transactions between the Owner/Project Manager and the Contractor and no amounts shall be payable on account of variation on taxes, duties and levies between the Contractor and its sub vendors/Sub-contractors/suppliers.

ii) Any statutory variation on account of aforementioned factors shall be reimbursed by Owner/Project Manager to Contractor or by the Contractor to the Owner/Project Manager, as the case may be, against submission of documentary evidence in support thereof. However, in case of delay, from the originally prepared network Schedule, Schedule and Guaranteed Completion Dates as may be relevant for the computation thereof, due to reasons not attributable to the Owner/Project Manager, any statutory variation adverse to the Owner/Project Manager over and above those specified under "Schedule of Quantity and Rates" as given elsewhere in the Contract, including any taxes during the delayed period shall be to the Contractor's account and the Owner/Project Manager shall not be liable for the same in any manner whatsoever.

iii) The Contractor is obligated to keep the Owner/Project Manager/Owner's Representative notified of the aforesaid statutory variations within 15 (fifteen) days of such variation coming into effect.

iv) The Contract Price and other prices given in the "Schedule of Prices" are based on the applicable tariff as indicated by the Contractor in the Schedule of Prices. In case this information subsequently proves wrong, incorrect or misleading, the Owner/Project Manager shall have no liability to reimburse/pay to the Contractor the excess taxes, fees etc; if any finally levied/imposed under the statutes except as provided in this clause. However, if the taxes/fee levied/imposed are lower than the amount indicated in the Schedule of Prices, the Owner/Project Manager shall be entitled to recover the difference from the Contractor.

v) Anti-Profiteering Clause: Notwithstanding anything contained in the Contract, in the event of introduction of any new legislation or any change or amendment or enforcement of any Act or Law, or any change in the interpretation by the Supreme Court of India of any said Act or law, rules or regulations of Government of India or State Government(s) or Public Body which becomes effective after the Bid Submission Due Date up to the FAC, if any, which results in any decrease in the cost of the Works / Relevant Package through reduced liability of taxes & duties, increase in the input tax credits, Contractor shall pass on the benefits of such reduced cost, taxes or duties to Owner, to the extent which is directly attributable to

such introduction of new legislation or change or amendment as mentioned above as per Anti-profiteering Rules, 2017, hereby, "Tax" or "tax" shall include taxes, duties, levies, cess and similar imposts by whatever name called whether in the nature of indirect tax or direct taxes and whether or not imposed by the central government, state government, local or municipal authority or any other statutory body.

vi) The Contractor shall comply with all the requirements prescribed in the GST Acts (including Central and State Acts) in respect of the activities/ supplies made by them under this Agreement/ Contract to enable Owner to avail input tax credits on timely basis.

vii) The Contractor shall comply with all the requirements prescribed in the BOCW Act (The Building and Other Construction Workers (Regulation of Employment and Conditions of Service) Act, 1996) pay the applicable BOCW cess at its own cost on timely basis and submit the compliance document to the Owner / Project Manager for their verification.

viii) All central / state / local indirect taxes, duties, levies or cess etc. even if not stated explicitly in the Price Schedule but applicable on the supplies / services delivered under the Contract shall be deemed to be part of the Contract Price and not payable separately. The Contractor shall comply with and pay all such central / state / local indirect taxes, duties, levies or cess etc. The Contractor shall be responsible for any loss of tax credit or any other costs including interest, penalty, etc. that may be levied or recovered by the statutory authorities from the Owner in the instance of default of obligations under this Section.

3.10.3 The tax invoices shall contain the details to comply with the GST Law. The Contractor shall,

i) Furnish (electronically) and communicate to the Owner, the details of Goods or Services supplied by the 10th of the month succeeding the said tax period,

ii) Upon discovery of any discrepancy, rectify it and shall pay the tax and interest thereof,

iii) Furnish the returns (electronically), for the inward and outward supplies of Goods and/or Services, before the specified dates as per the GST Law,

iv) Communicate the tax paid, credits etc. as and when credited.

v) The Invoice should clearly state the description of the goods, quantity, sale price, tax %, and tax amount;

vi) The Invoice should be signed by an Authorized Signatory.

Bills/Invoices in the name of The Tata Power Company Ltd. with packing lists in triplicate shall be forwarded along with the equipment.

Contractor to furnish GST Registration number in all invoices as well as Owner's GST number.

3.10.4 In case any taxable service is provided by any Contractor who is a non-resident or who does not have an office in India, then contractor shall undertake to appoint a representative in India. The Contractor shall pay the required amount of GST to this representative who in turn shall affect the payment of the tax to appropriate authority. Owner/Project Manager will not take any responsibility to pay GST.

On the basis of documentary proof of such payment of tax, the Owner/Project Manager would be entitled to declare the particulars thereof in his GST return.

The agreed rates against items in Schedule of Price shall be deemed to be inclusive of GST for such taxable service provided by the Contractor who is a non-resident or who does not have an office in India. The Owner/Project Manager will not pay any extra cost towards GST..

3.10.5 **Withholding taxes**

The Owner/Project Manager shall pay, out of the Contract Price, any withholding tax charged by any Government Instrumentality including the Government of India or any Indian State Government on the Contract or the performance of the Work pursuant to or under the Contract. The Owner/Project Manager shall furnish to the Contractor appropriate documentation / certificates/ challans evidencing payment of any such withholding tax.

Should any tax benefit accrue to the Contractor in Country of the Contractor / or Owner/Project Manager by way of deduction as expenses or as tax credit or otherwise against its tax liability, or on account of any taxes paid in India by the Owner/Project Manager pursuant to the Contract or any Applicable Law on account of this Contract, the Contractor shall forthwith pay the same to the Owner/Project Manager. The Contractor agrees and undertakes to furnish to the Owner/Project Manager every year till the end of the period during which the Contractor is entitled to any tax benefit in India or elsewhere pursuant to this clause or completion of its tax assessment whichever, is later, a certificate from its independent Auditors or an independent certified public accountant acceptable to the Owner/Project Manager, the quantum of such tax benefit, if any, and basis for arriving at such tax benefits.

3.10.6 **Benefit of credit for tax**

For tax, levy, duty concessions Owner/Project Manager will initiate necessary applications & the procedures and will expedite the documentation / certification required in time for availing the benefits. In case of unforeseen delays from the approving authorities, contractors shall manage the implications and will carry out necessary documentation / submissions to avail these benefits at a later date once the Owner/Project Manager is in receipt of the required certificate.

If, as a result of any agreement, whether existing or modified or signed in future on avoidance of double taxation between the Government of India and the Government of the Contractor's Country or under any law, any tax benefit shall accrue to the Contractor in Country of the Contractor or by way of deduction as expenses or as tax credit or refund or otherwise against its tax liability or on account of taxes, which are paid in India by the Owner/Project Manager pursuant to this Contract, the benefit of such credit, deduction as expense or refund along with details shall be passed on to the Owner/Project Manager within 15 (fifteen) days of the receipt of such credit / refund/deduction as expense or otherwise by the Contractor/expatriate. The Contractor/its expatriates shall take immediate and appropriate action for obtaining the admissible credit or refund from such Country's authorities and payment of the same to the Owner/Project Manager. The Contractor shall at all times keep the Owner/Project Manager informed about the same.

The Contractor shall furnish on an annual basis, a certificate from an independent Chartered Accountant confirming:

a) The amount of credit or refund or deduction as expense or otherwise that may be due, if any, to it on account of tax paid by the Owner/Project Manager in India in respect of payments under the Contract to the Contractor; and

b) Amount of credit or refund that may be obtained or deduction as expense that may be permissible, if any, during the relevant period.

No such annual certificate is required with regards to expatriates' tax credit or refund. However, the Contractor will inform the Owner/Project Manager of all such credits or refunds obtained by its expatriates as aforesaid.

3.11 **Security & Safety Rules of Owner**

3.11.1 The site is a protected place and entry to the site is restricted. No person shall be employed or allowed on the site without the prior permission in writing from the Owner. All persons employed or allowed at the site shall at all times conform to all regulations laid down by the Owner.

3.11.2 The Contractor shall strictly follow Security Instructions of the Project Site and maintain proper control on movement of his men/materials. He shall implement the procedures for entry token/passes at his cost as required. He will record entry of all incoming materials, as no materials, which are returnable, will be permitted to be removed if not recorded at the time of entry. Contractor shall strictly abide by the rules and regulations of security and safety enforced by the Owner. Contractor shall provide proper identity cards, badges, etc., to its personnel and to its Sub-contractors and their personnel whenever directed by the Owner. Contractor shall be solely responsible for the safety and security of its personnel and equipment. Contractor shall indemnify and hold Owner/Project Manager harmless from time to time from and against any all losses, claims, suits, proceedings, taxes, penalties, liability, damages, costs and expenses, suffered or incurred, arising out of or in connection with any bodily injury caused to the representatives/employee of the Contractor or any other third party.

3.11.3 Contractor shall do all things necessary or expedient to protect any and all parallel, converging and intersecting electric lines and poles, highways, access or other roads, bridges, waterways, railroads, sewer lines, natural gas pipelines, drainage ditches, culverts, fences, walls, and water lines, power or communication cables or lines and any and all physical property of others, from damage resulting directly or indirectly from performance of the Work. Without limiting the generality of the foregoing, Contractor shall maintain the access roads to the Site and all access roads within the Site, in good repair and passable at all times as well as proper drainage system. In the event that any such physical property is damaged or destroyed in the course of the performance of the Work, Contractor at his cost shall rebuild, restore or replace such damaged or destroyed physical property to full satisfaction of Owner/Project Manager and shall fully indemnify and hold the Owner / Project Manager harmless from time to time and against any all losses, claims, suits, proceedings, taxes, penalties, liability, damages, costs and expenses, suffered or incurred, arising out of or in connection with the performance of the Work, whether directly or indirectly.

3.11.4 Contractor shall provide, and shall ensure that its Sub-contractors provide, proper and ample protection from damage or loss to the Works/other packages, the Site, equipment and construction equipment during its performance of the Work.

3.11.5 In the event that any of the Works are damaged or destroyed for any reason prior to acceptance of such work, Contractor shall rebuild, restore or replace the works or such items, subject to and in accordance with the Contract including Specifications. All costs irrespective of reimbursement of claims from Insurance shall be to Contractor's account.

3.11.6 Contractor shall adopt all safety measures/provide necessary protection to already constructed foundation/structures irrespective of the sequence of construction.

3.12 **Royalties and License Fees**

3.12.1 Contractor shall pay all required royalties and license fees with respect to proprietary rights, intellectual property licenses and agreements, and shall procure, as required, the appropriate proprietary rights, intellectual property licenses and agreements, for Materials, methods, processes, systems and Services incorporated into the Relevant Package or the Project or otherwise relating to the performance of the Work and thereafter for the purpose of operation & maintenance of the Works. Contractor should possess the valid license for the technology used in India by such Contractor from their principals/ technology providers. Contractor shall also arrange backup guarantees from their principals/ technology providers as required by the Owner/Project Manager, to demonstrate the Contractor's legal rights to use such intellectual property.

3.13 **Standard for Supplies and Performance**

3.13.1 Without limiting any other provision of Contract including Specifications, Contractor shall perform the Work and cause his Sub-contractors to perform their Work hereunder in accordance with Good Construction Practices and standards of professional care, skill, diligence and competence generally accepted in the construction industry applicable to construction & project management practices for Structures of similar size and type as the Works.

3.14 **Fire Protection**

3.14.1 The Work procedures that have to be used during the construction / erection shall be those, which minimize fire hazards to the extent practicable. Combustion materials, combustible waste and rubbish shall be collected and removed from the Site at least once each Day. Fuels, oils and volatile of flammable Materials shall be stored away from the construction and equipment and material 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 Site, the same shall be removed and replaced with acceptable material before moving into the construction or storage area.

3.14.2 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 of waterproof and flame-resistant type.

All other Materials such as working Drawings, plans, 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.

3.14.3 All the Contractor's supervisory personnel and sufficient number of workers shall be trained for firefighting 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.

3.14.4 The Contractor shall provide enough fire protection equipment of the types and in enough numbers for the ware-houses, office, temporary appropriate structures, labour colony area, etc. Access to such fire protection equipment, shall be easy and be kept open at all times.

3.14.5 In the event of occurrence of fire being attributable in the opinion of the Owner / Project Manager to the contractors' negligence no extension of time will be granted.

3.15 **Contractor's Equipment and Owner/Project Manager's rights thereof**

3.15.1 All equipment provided by the contractor & his Sub-contractors shall be certified, tested & valid by the competent Person. The Contractor shall provide all Contractor's equipment necessary to perform the Work and complete the Works. All Contractors' equipment shall, when brought on to the Site, be deemed to be exclusively intended for the execution of the Works and performance of Services. The Contractor shall not remove from the Site any such Contractor's Equipment without the consent of the Owner/Project Manager / Owner's Representative. The Contractor shall nevertheless be solely liable and responsible for any loss or destruction thereof and damage thereto.

3.15.2 The Owner/Project Manager shall have 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/Project Manager 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.

3.16 **Access Route to & at site**

The Contractor shall be deemed to have satisfied himself as to the suitability and availability of the access routes to the Site that he chooses to use. The Contractor shall (as between the Parties) be responsible for the maintenance of access routes. The Contractor shall provide any signs or directions, which he may consider necessary for the guidance of his staff, labour and others. The Contractor shall obtain any permission that may be required from the relevant authorities for the use of such routes, signs and directions.

The Owner/Project Manager will not be responsible for any claims which may arise from the use or otherwise of any access route. The Owner/Project Manager does not guarantee the suitability or availability of any particular access route, and will not entertain any claim and shall not be liable for any non-suitability or non-availability for continuous use during construction of any such route.

3.17 **Insurance**

Contractor shall obtain and maintain all insurance required to be obtained by Contractor as per the Contract and as per statutory requirements including clause 4.0 hereof.

3.18 **Maintenance of Schedule and Milestone Schedule**

If Contractor is not performing the Work at a rate which will maintain the Schedule or the Milestone Schedule, Contractor shall at its own expense shall cause Contractor's personnel, to work such overtime and furnish such additional personnel and construction equipment and resources as may be required to comply with the Schedule or the Milestone Schedule (as the case may be).

3.19 **Work and Safety Regulations**

3.19.1 The Contractor shall ensure proper safety of all the workmen, Materials and equipment belonging to him or to Owner/Project Manager or to others, working at the Site. The Contractor shall also be responsible for provision of all safety notices and safety equipment required both by the relevant legislations and the Owner's Representative, as he may deem necessary.

3.19.2 The Contractor shall notify well in advance to the Owner's Representative of his intention to bring to the Site Container filled with liquid or gaseous fuel or explosive or petroleum substance or such chemicals, which may involve hazards. The Owner's Representative shall have the right but not the obligation to prescribe the conditions, under which such container is to be stored, handled and used during the performance of the Work and the Contractor shall strictly adhere to and comply with such instructions.

3.19.3 The Owner's Representative shall have the right but not obligation 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/Project Manager and the Owner/Project Manager shall not entertain any claim of the Contractor towards additional safety provisions / conditions to be provided for / constructed as per Owner's Representative's Instructions.

3.19.4 Wherever 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 as well as other relevant and Applicable Laws, rules and regulations. All such storage shall have prior approval of the Owner's Representative. In case, any approvals are necessary from the Chief Inspector (Explosives) or any statutory authorities, the Contractor shall be responsible for

obtaining the same. Notwithstanding anything contained herein, the Contractor shall not store any petroleum products or petroleum mixtures or any other explosive material in the Site for a period in excess of 7 days, without the prior written consent of the Owner's Representative.

3.19.5 All equipment used in construction and erection by Contractor or his Sub-contractors shall meet Indian and International Standards of safety 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 or his Sub-contractors in accordance with Manufacturer's operation manual and safety instructions and as per Guidelines and Rules of the Owner/Project Manager in this regard.

3.19.6 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 2003 and all relevant Law/Rules in force from time to time. A register of such examinations and Test shall be properly maintained by the Contractor and will be promptly produced as and when desired by Owner's Representative or by the Person authorised by him.

3.19.7 Not Used

3.19.8 The Contractor shall provide suitable safety equipment of prescribed standard to all employees and workmen according to the need, as may be directed by Owner's Representative who will also have right to examine these safety equipment to determine their suitability, reliability, acceptability and adaptability.

3.19.9 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 of Practices/Rules framed under relevant laws, rules and regulations not restricted to Indian Explosives Act pertaining to handling, storage and use of explosives.

3.19.10 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 shall be erected under the control and supervision of and experienced and competent Person. For erection, good and standard quality of material only shall be used by the Contractor.

3.19.11 The Contractor or his Sub-contractors shall not interfere or disturb electric fuses, wiring and other electrical equipment belonging to the Owner/Project Manager or other Contractors under any circumstance, whatsoever, unless expressly permitted in Writing by the Owner/Project Manager to handle such fuses, wiring or electrical equipment.

3.19.12 Before the Contractor or his Sub-contractors connects any electrical appliances to any plug or socket belonging to the other Contractor or Owner/Project Manager, he shall:

a) Satisfy the Owner's Representative that the appliance is in good working condition

b) Inform the Owner's Representative of the maximum current rating, voltage and phases of the appliances

c) Obtain permission of the Owner's Representative detailing the sockets to which the appliance may be connected.

3.19.13 The Owner's Representative will not grant permission to connect until he is satisfied that:

a) The appliance is in good condition and 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.

3.19.14 No electric cable used by the other Contractor/Owner/Project Manager 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.

3.19.15 No repair work shall be carried out on any live equipment. The equipment shall/must be declared safe by Owner's Representative and a permit to Work shall be issued by Owner's Representative before any repair work is carried out by the Contractor or his Sub-contractors. While working on electric lines/equipment whether live or dead, suitable type and sufficient quantity of tools will have to be provided by Contractor or his Sub-contractors to electricians/workmen/officers.

3.19.16 The Contractor shall employ necessary number of qualified, full time Electricians/Electrical Supervisors to maintain his temporary electrical installations.

3.19.17 The Contractor employing more workmen than specified under Factories Act 1948 whether temporary, casual, probationer, regular or permanent or on Contract, shall employ at least required numbers of full time officers exclusively as Safety Officer to supervise the safety aspects of the equipment and workmen who will coordinate with the Project Safety Officer and Owner's Representative. In case of Work being carried out through Sub-contractors, the Sub-contractor's workmen/employees will also be considered as the Contractor's workmen/employees for above purpose.

3.19.18 The name and address of such Safety Officers of Contractor will be promptly informed in Writing to Owner's Representative 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.

3.19.19 In case any accident occurs during the construction/ erection or other associated activities undertaken by the Contractor thereby causing any minor, major or fatal injuries to his employees due to any reason, whatsoever, it shall be the responsibility of the Contractor to promptly inform the same to the Owner's Representative in prescribed form and also to all the authorities envisaged under the Applicable Laws.

3.19.20 The Owner's Representative 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 with the instructions of the Owner's Representative including removal of shortcomings promptly. The Contractor after stopping the specific Work, can, if felt necessary, appeal against the order of stoppage of Work within 3 (three) Days of such stoppage of Work and Owner/Project Manager's decision in this respect shall be conclusive and binding on the Contractor.

3.19.21 The Contractor shall not be entitled for any damages/compensation for stoppage of Work due to safety reasons as provided in clause 3.19.19 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.

3.19.22 The Contractor and his Sub-contractors shall follow and comply with all Safety Rules, relevant provisions of Applicable Laws pertaining to safety of workmen, employees, Works and equipment as may be prescribed from time to time without any demur, protest or contest or reservation.

3.19.23 **Training of work force deployed by the Contractor / its Sub-contractors at TPSDI:**

Tata Power has established state-of-the-art vocational / skills development training facilities at its major facilities like Trombay, Shahad (near Mumbai), Mundra, Maithon etc. under the entity The Tata Power Skill Development Institute (TPSDI) as a Corporate Social Responsibility endeavour to

empower youth and others with employable skills, especially in the Power and allied sectors, and to address the skill gap challenge faced by the Indian Power Sector.

The TPSDI program is in congruity with the National Skill Quality Framework (NSQF). The TPSDI Competency Framework allows participants to swiftly pick up readily deployable skills and continue upgrading their skills after convenient intervals over a period of time. The trainings are offered by TPSDI at nominal charges published time to time.

In order to improve work safety and to ensure that all work force deployed at Owner premises have the right orientation / induction and skills training before they undertake any work, Contractor shall ensure all workforce employed by Contractor / his Sub-contractors are TPSDI qualified in work safety and their respective skills / crafts as detailed out in the Tata Power Safety Terms & Conditions annexed to this GCC.

3.20 **Employee Identification, Project Site Security and Protection of Project Site**

3.20.1 Contractor shall provide a method which shall be subject to the reasonable approval of Owner/Project Manager, of checking the employees of Contractor, the Sub-contractors, Owner/Project Manager and Owner's/Project Manager's other suppliers and Contractors in and out of the areas in which the Work is to be performed under the Contract.

3.20.2 Contractor's employees shall wear identification badges provided by the Owner's Representative while on Work at Site.

3.20.3 Contractor shall at all times be responsible for the security of the Works and the Site at all times and the Goods therein while the Work is being performed or Goods are being supplied up to the earliest of:

a) Take-over and issuance of provisional Acceptance Certificate

b) The transfer of care, custody and control of the Works as a whole to Owner /Project Manager with the concurrence of the Owner/Project Manager, or

c) Termination of the Contract.

3.20.4 Contractor shall do all things necessary or expedient to protect any and all parallel, converging and intersecting electric lines and poles, highways, access or other roads, bridges, waterways, railroads, sewer lines, natural gas pipelines, drainage ditches, culverts, fences, walls, and water lines, power or communication cables or lines and any and all physical property of others, from damage resulting directly or indirectly from performance of the Work or in supply and transport of Goods. Without limiting the generality of the foregoing, Contractor shall maintain the access roads to the Site and all access roads within the Site in good condition and passable at all times as well as proper drainage system. In the event that any such physical property is damaged or destroyed in the course of the performance of the Work or in supply and transport of Goods, Contractor at his cost shall rebuild, restore or replace such damaged or destroyed physical property to full satisfaction of Owner/Project Manager.

3.20.5 Contractor shall provide, and shall ensure that its Sub-contractors provide, proper and ample protection from damage or loss to the Relevant Package, the Site, equipment and construction equipment during its performance of the Work.

3.20.6 In the event that any of the Relevant Package or Works or Facility or any other assets, equipment or material of Other Contractor or any third parties are damaged or destroyed for any reason prior to acceptance and Final take-over of such Relevant Package or Works, Contractor shall rebuild, restore or replace the Relevant Package/Works so as to deliver the Relevant Package complete in all respect and shall build, restore or replace all such other damaged or destroyed items, subject to and in accordance with the Contract of the Facility or of the third parties back to their original

state prior to the event or otherwise satisfy all claims for damages of third parties.. All costs irrespective of reimbursement of claims from Insurance shall be to Contractor's account.

3.21 **Safety Programme and Policy**

3.21.1 The Contractor shall strictly comply with the Owner's Contractor Safety Policy and Safety Terms and Conditions. Any misconduct and/or violations with respect to the Owner's Contractor Safety Policy and Safety Terms and Conditions or any other legal and statutory provisions pertaining to Safety, Health and Environment shall be dealt with as per the Safety Terms and Conditions. Contractor shall, and shall cause all Sub-contractors to, implement and administer a safety program for the Relevant Package, subject to the approval of the Owner/Project Manager (which shall not be unreasonably withheld), which shall include:

a) Development of a safety manual (the "Safety Manual") establishing safety guidelines and requirements for Contractor, Sub-contractor (including a fall prevention program). Copies of this manual shall be provided to Owner/Project Manager and Owner's Representative immediately upon its development and Contractor shall incorporate into such Safety Manual any and all reasonable comments of Owner/Project Manager;

b) Conducting of weekly safety meetings with the employees and agents of Owner/Project Manager, Contractor, Sub-contractor and Owner's other Contractors and their Sub-contractors;

c) Development, implementation and enforcement of procedures for advising employees and agents of Owner/Project Manager, Contractor, Sub-contractor and Owner's other Contractors and their Sub-contractors of, and correction of, safety violations and deficiencies;

d) Taking of all other actions necessary to provide a safe Work environment in accordance with Applicable Laws and Applicable Permits. Contractor shall take all reasonable precautions for the safety of, and shall provide all reasonable protection to avoid damage, injury or loss to:

   i) All persons employed by the Owner/Project Manager, Contractor and its Sub-contractors and Owner's other Contractors and their Sub-contractors in connection with the Work or supply of Goods or Owner/Project Manager and its Contractors and Sub-contractors (whether in the performance of their obligations under the Contract or otherwise) and all other persons who may be affected by the performance of the Work or supply of Goods or any of such persons.

   ii) All supplies used in connection with the Relevant Package and all equipment to be incorporated into the Relevant Package, whether in storage on or off the Site under the care, custody or control of Owner/Project Manager, Contractor, any Sub-contractor or Owner's other Contractors and their Sub-contractors.

e) At all times (including during Commissioning, start-up, testing and Initial Operation, and Tests before Take-over including Performance Tests) Contractor shall require all Sub-contractors working on or supplying equipment or construction equipment to the Site to comply with all safety requirements in effect at all such times and of all Applicable Laws and Applicable Permits. Contractor shall, and shall cause the Sub-contractors to, comply with all Applicable Laws and Applicable Permits.

3.21.2 Contractor shall submit list of tools & tackles with details of make, year of manufacturing, valid certification to the Owner/Project Manager's Representative for approval.

Owner/Project Manager may during the execution of the Relevant Package inspect & verify that the tools & tackles are as per the qualification requirements approved by him and will have right

to seek replacements in case of any discrepancies. The Contractor shall always comply with such directives.

3.22 **Protection of the Environment:**

3.22.1 The Contractor shall take all reasonable care and actions to protect the environment both on and off the Site and to limit the damage and nuisance to people and property resulting from pollution, noise and other results of his operations.

The Contractor shall ensure that emissions, surface discharges and effluent from the Contractor's activities shall not exceed the values prescribed by Applicable Laws and the values as indicated in the Technical Specifications.

3.22.2 The Contractor shall be required to ensure that there shall be no cutting of trees by him or his labourers or their family members and he will be solely responsible for their acts in this regard. The Contractor shall try to maintain ecological balance by preventing deforestation, water pollution and defacing of natural landscape in the vicinity of work areas. The Contractor shall so conduct his construction operations as to prevent any unnecessary destruction of, scarring or defacing the natural surroundings in the vicinity of the work area. In order to maintain the ecological balance, the Contractor shall specifically observe the following instructions:

a) Where unnecessary destruction, scarring, damage or defacing may occur as a result of the Contractor's operation, the same shall be repaired, replanted or otherwise corrected at the Contractor's expense. The Contractor will prevent scattering of rocks and other debris outside the work areas. All work areas shall be smoothed and graded in a manner to conform to the natural appearance of the landscape as directed by the Engineer.

b) All trees and shrubs which are not specifically required to be cleared or removed for construction purposes shall be preserved and protected from any damage that may be caused by the Contractor's construction operation and equipment. The removal of trees or shrubs will be permitted only after prior approval by the Owner / Project Manager. Special care shall be exercised where trees or shrubs are exposed to injuries by construction equipment, blasting, excavating, dumping, chemical damage or other operation and the Contractor shall adequately protect such trees by use of protective barriers or other methods approved by the Owner/Project Manager. Trees shall not be used for anchorage.

c) The Contractor's construction activities shall be performed by methods that will prevent entrance or accidental spillage of solid matter contaminants, debris and other objectionable pollutants and wastage into the river/water bodies. Pollutants and wastes shall be disposed of in a manner and at sites approved by the Owner/Project Manager. The Contractor shall fully comply with Water (Prevention and Control of Pollution) Act 1974- Section 33 (A) including any further latest notifications thereon.

d) In the conduct of construction activities and operation of construction equipment, the Contractor shall utilize such practicable methods and devices as are reasonably available to control, prevent and otherwise minimize air pollution. The Contractor shall fully comply with Air (Prevention and Control of Pollution) Act, 1981 – Section 31(A) including any further latest notifications thereon.

e) Burning of materials resulting from clearing of tree, bush, combustible construction materials and rubbish shall not be allowed and shall be disposed in environmentally friendly manner.

f) The Contractor shall be required to prevent flowing of debris and muck into the river/water bodies. Necessary restricting structures like walls/crates etc. shall be constructed for the purpose. Before handing over the Site to the Owner/Project Manager at the end of construction, the Contractor shall also stabilize the muck fully i.e. consolidation and compaction of the muck shall be carried out in the muck dump sites.

g) All the construction equipment which are likely to generate high noise levels are to be fully equipped (with noise reduction measures) to meet the ambient noise control standards.

All costs related to preservation and maintenance of the environment at Site shall be deemed to have been included in the Contract Price.

3.22.3 The Contractor shall indemnify and hold the Employer harmless against and from all claims, damages, losses and expenses (including legal fees and expenses) resulting from the consequences of any failure by the Contractor to comply with the provisions of the clause 3.22.

3.23 **Affirmative Action:**

The Owner recognizes that diversity in the workplace positively impacts business. The Owner commits itself in helping people from SC/ST background either by helping them to become entrepreneurs or by engaging workforce from SC/ST community under the contracts agreed herein. To encourage engaging SC/ST community, the Owner may agree to incentivise the Contractor by paying additional 1% of the contract value, if the number of SC/ST workforce engaged in the contract exceeds 30% of the total deployed strength and 2%, if the strength goes beyond 50%, however, subject to a maximum incentive of INR 5 million on this account. While the Contractor will assist the workforce so engaged to become self-reliant in meeting the work expectation, the Owner will also volunteer its training resources to the extent possible to improve their employability.

The Contractor shall maintain the proper documentation of such category of the workforce engaged and the owner shall pay the incentive after its verification.

3.24 **DRAWINGS AND SCHEDULE OF QUANTITIES**

3.24.1 One set of the drawings and specifications and schedule of quantities shall be furnished by the Owner/Project Manager to the Contractor, and Owner/Project Manager shall furnish, within such time as he may consider reasonable, one copy of any additional drawing/s which in his opinion may be necessary for the execution of any part of the work. Such copies shall be kept on the works and the Owner/Project Manager and their representatives shall at all reasonable times have access to the same, and they shall be returned to the Owner/Project Manager by the Contractor before the issue of the certificate for the balance of his account under the Contract. This contract and the signed drawings and specifications and schedule of quantities shall remain in the custody, of the Owner/Project Manager, and shall be produced by him at his office as and when required by the Owner/Project Manager or by the Contractor.

3.24.2 Owner shall also supply construction drawings and details progressively during the contract period, to cover all the works envisaged in the scope of the contract. Construction drawings would be issued at the commencement of the work and subsequently to ensure that progress is maintained at the required pace, to meet the agreed work schedule of completion provided design data are available. If the Contractor apprehends any delay in construction for want of drawings and details, he shall, immediately advice the Owner/Project Manager in writing accordingly. In case the work is retarded or even stopped temporarily for lack of details and construction drawings to proceed with, the Contractor would be given extension of time to the

extent his work has been held up for want of drawings. The Owner/Project Manager's decision in regard to the extension of time allowed on this account shall be final and binding.

3.24.3 Only figured dimensions on drawings will be followed and drawings to large scale shall generally take precedence over those to a smaller scale. Detailed drawings and notes appended thereon shall be deemed to form part of the specifications and to supersede the specification in case of discrepancies. However, all documents shall be considered mutually explanatory.

3.24.4 Contractor shall prepare and submit detailed fabrication drawings based on the drawings and/or instructions furnished by Owner for structural steel and works which require further detailing for successful execution of works. Owner's Engineer shall review and comment such detailed drawings submitted by Contractor. Contractor will have to re-submit the commented drawings till the Owner approves the drawings as fit for fabrication / construction. Contractor must note that it is his responsibility to timely submit and obtain Owner's approval on the fabrication / detailed drawings without affecting the Project progress and schedule. The Contractor must submit and adhere to fabrication / detailed drawing schedule in accordance with the Project requirements and to the Owner's satisfaction as would be decided during the kick-off meeting with him.

3.25 **MEASUREMENT OF WORKS**

3.25.1 The Owner/Project Manager/ Owner's representative may from time to time intimate to the Contractor that they require the works to be measured and the Contractor shall attend or send a qualified agent to assist the Owner/Project Manager and Owner's representative in taking such measurements and calculations and to furnish all particulars or to give all assistance required by either of them.

3.25.2 Should the Contractor not attend or neglect or omit to send such agents then the measurements taken by the Owner/Project Manager/ Owner's representative or approved by them shall be taken to be the correct measurements of the work. Such measurements shall be taken in accordance with the Mode of Measurements mentioned in the specification.

3.25.3 Any claim which the Contractor may have to make in respect of such measurement shall be made by him in writing to the Owner/Project Manager within seven days of the date of these measurements, failing which the measurements shall be deemed to have been accepted by the Contractor.

3.25.4 Where mode of measurement is not specified, the measurements will be taken at site as per I.S. Code of Practice for Measurements. The Contractor shall give all assistance for taking measurements like steel measuring tapes, scaffolds, ladder and including surveyors with surveying instruments for checking and confirming levels.

3.26 **SCHEDULE OF QUANTITIES - NO CLAIM BECAUSE ACTUAL QUANTITIES DIFFER FROM PRELIMINARY STATEMENT**

3.26.1 The quantities of the various kinds of work to be done and materials to be furnished under this Contract which have been estimated and are set forth in the proposal or the Agreement or the Schedule of Quantities and Rates are the best available, but may not be accurate in any or all particulars and are only for the purpose of comparing on a uniform basis the bids offered for the work under this Contract

3.26.2 The Contractor agrees that neither the Owner/Project Manager nor the Engineer nor any of the employees or agents thereof shall be held responsible if any of the said estimated quantities should be found to be not even approximately correct in the construction of the work and that he will not at any time dispute or complain of such statement nor assert that there was any

misunderstanding in regard to the character, size and type of work to be done or the kind or amount of the materials to be furnished or work to be done. Further, the Contractor shall make no claim for anticipated profits, for loss of profit or for damage because of a difference between the quantities of the various kinds of work to be done or materials actually delivered and the estimated quantities set forth by the Owner/Project Manager or the Engineer

3.26.3 The rates/prices quoted by the Contractor in the schedule of rates/prices shall be firm irrespective of any variation in the quantities of individual items of work and/or in the total Contract Price unless otherwise specified in Special Conditions of Contract.

3.27 **CONTRACTOR INFORMED, AS TO THE CONDITIONS**

3.27.1 The Contractor shall inspect, examine and obtain all information and satisfy himself regarding all matters and things such as right of way, surface and sub-surface water conditions to be encountered, the character of equipment and facilities needed for the prosecution of work; the location and suitability of all construction materials, the quantities of various sections of the work, and local labour conditions, relating to the execution and maintenance of the works to be carried out under the Contract or any hindrances or interference's to or with construction and maintenance of the works from any cause whatsoever including any other operation of works, which may or will be carried out on or adjacent to the site of the works under the Contract and shall make allowance for all such contingencies in the Contract Price and will not raise any claims or objections against the Owner/Project Manager in any of such matters as mentioned above.

3.27.2 The acceptance of the order or making of a Contract will be construed as evidence that such an examination was made and later claims for labour, equipment or materials required for difficulties encountered will not be allowed.

3.27.3 Any record of subsurface condition, water records and other observations which may have been made by the Owner/Project Manager or the Engineer have been made with reasonable care and accuracy. Such records may be made available to the Contractor for his information, if available, but there is no expressed or implied guarantee, as to the accuracy of the records nor any interpretation of them. The Contractor shall recognise this and form his own opinion of the character of the materials to be encountered or excavated, from an inspection of the ground and put his own interpretation on records.

3.27.4 The prices quoted by the Contractor shall be based on his own knowledge and judgement of the conditions and hazards involved and not upon any representation of the Owner/Project Manager or the Engineer.

3.28 **CONTRACTOR TO PROVIDE EVERYTHING NECESSARY**

3.28.1 The Contractor shall provide everything necessary for the proper execution of the Works according to the intent and meaning of the drawings, schedule of quantities and specifications taken together whether the same may or may not be particularly shown or described therein provided that the same can reasonably be inferred there from and if the Contractor finds any discrepancy therein shall immediately and in writing refer the same to the Engineer whose decision shall be final and binding on the parties.

3.28.2 The Contractor shall supply, fix and maintain at his cost, during the execution of any works all the necessary cantering, scaffolding, staging, planking, timbering, strutting, shoring, pumping, fencing, hoarding, watching and lighting by night as well as by day, etc required not only for the proper execution and protection of the Works, but also for the protection of the public and the safety of any adjacent roads, streets, cellars, vaults, walls, houses, buildings and all other erections, matters or things, and the Contractor shall take out and remove any or all such

cantering, scaffolding, staging, planking, timbering, strutting, shoring etc. as occasion shall require or when ordered to do so and shall fully reinstate and make good all matters and things disturbed during the execution of the works to the satisfaction of the Engineer. The Contractor shall be paid no additional amount for the above and for any access roads to be made to reach the construction site.

3.28.3 All materials shall be new and of the best respective kinds described in the schedule of quantities and/or Technical Specifications and in accordance with the Engineer's Instructions and the Contractor shall upon the request of the Engineer, furnish him with all invoices, accounts, receipts, certificates and other vouchers, to prove that the materials comply therewith. The Contractor shall at his own cost arrange for and/or carry out any test of materials which the Engineer may require. The contractor shall establish and operate a full-fledged cement and concrete testing laboratory at site and depute a full-time qualified QA/QC engineer for the duration of the contract at no extra cost to the Owner/Project Manager. Such full-fledged cement and concrete testing laboratory at the site shall be as per provision of IS:456 and Contractor shall also depute an independent qualified QA/QC engineer full-time at the site for the duration of the contract.

3.28.4 It shall be the responsibility of the Contractor to unload and store in a safe and acceptable manner all construction materials as directed by the Owner/Project Manager.

3.28.5 The Contractor is required to provide and maintain all tools, and equipment and instruments necessary to perform his work. He shall provide all fuels, lubricants and compressed air for the operation and maintenance of his construction tools.

3.28.6 The Contractor is to arrange for all his requirements of such materials including but not limited to oxygen, Acetylene, pipes, ropes, welding rods etc required for performing the Works.

3.28.7 Samples of all materials to be used, whether cement, steel, bricks, rubble stone, aggregate, sand, timber, tiles, granite, finishing & building interior etc. shall be submitted by the Contractor and must be got approved by the Owner/Project Manager before they are used. Approved samples shall be kept with the Owner/Project Manager and all supplies shall strictly conform to the approved samples. Materials not strictly conforming to the samples are liable to the rejected.

3.28.8 The Contractor shall not sell, assign, mortgage, hypothecate or remove equipment or materials which have been installed or which may be necessary for the completion of the Contract without the written consent of the Owner/Project Manager.

3.28.9 Contractor shall provide and maintain at the site necessary number and type of machinery and equipment including survey instruments, TOTAL Station, Auto level etc. in good working condition for proper setting out and timely completion of the various works covered under Relevant Package. All arrangements for transporting the equipment to and from the site shall be done by the Contractor at his own expense. Contractor has to provide all the survey equipment including all technicians, helpers etc., for checking other works also if so desired by Owner with no additional cost of the Owner. No claim shall be entertained for mobilising additional equipment and/or personnel to complete the work within the stipulated time.

3.28.10 Contractor shall provide all fuels and lubricants required for the operation and maintenance of construction machinery and equipment as well as his transport vehicles.

3.28.11 Contractor shall at his cost arrange for all his requirements of such materials as, but not limited to, oxygen, acetylene, welding electrodes, ropes, form ties, turn-buckles, clamps, wiping rags and sandpapers etc. which are required to satisfactorily perform his work.

3.28.12 It shall be ensured by the Contractor that work shall proceed uninterrupted even in the event of power failures with the help of DG Sets and Diesel compressors. As such, adequate number of

diesel operated machinery (such as boring rigs, concrete mixers, vibrators, welding sets, etc.) shall be provided by the Contractor as an alternative arrangement in case electrically operated machinery are proposed to be brought to site.

3.28.13 The Contractor will be required to provide at his own cost all facilities for his office, warehouse, tool room, change room or any other building/structure required to the Works.

3.28.14 Contractor shall establish his own office / shed at specified place inside/near the Project site for his worker/staff. The Contractor's office/shed shall be porta-cabin type. Only the shed for storing Cement shall be in brick masonry. In addition the office/shed shall have proper ventilation lighting and sanitary facilities. Contractor shall plan their site facilities and obtain clearance from the Owner before construction of the Office/shed.

3.28.15 All royalties shall be paid by the Contractor as also all tolls, local and other taxes, etc. at no extra cost to Owner. The rates quoted for excavation shall include Collector's permissions for Excavation permits, Royalty payments, disposal at the local / state / central pollution control board approved yard etc.

3.28.16 All materials supplied by the Contractor shall be of the best quality and shall conform to the Technical Specification. Approval in writing shall be obtained from Owner before any alternative or equivalent material is proposed to be used by the Contractor.

3.28.17 The Contractor shall get tested all materials supplied by him in a Owner approved laboratory, as directed by Engineer or as specified in the corresponding code of practice, at no extra cost to the Owner. This is in addition to furnishing the Manufacturer's Test Certificate where available.

3.28.18 Contractor shall obtain all necessary permits and licenses before commencement of work at no extra cost to Owner.

3.28.19 The Contractor shall have PF coverage, for all workmen in his permanent employee as well as those temporarily hired by him for the said Project. He shall also have ESIC cover for all workmen, permanent as well as temporary if required by law. The cost for both the above viz. PF as well as ESIC shall be deemed to have been covered in the rate quoted by contractor. The Owner shall not pay any extra charges over and above the rates quoted for these statutory payments.

3.28.20 Ash shall be utilized in Civil Works to the extent possible without affecting the quality and engineering requirements. Vendor shall declare Ash utilization Quantity or Percentage of ash used in allied civil works. Wherever available, ash shall be made free of cost at point of generation for the purpose by Owner. The usage of ash for the purpose shall be approved by Engineer-in-charge / Order Manager.

3.29 **TO DEFINE TERMS AND EXPLAIN PLANS**

3.29.1 The various parts of the Contract are intended to be complementary to each other, but should any discrepancy appear, or any misunderstanding arise as to the import of anything contained therein, the explanation of the Owner/Project Manager shall be final and binding. The correction of any errors or omissions of the drawings and specifications may be made by the Owner/Project Manager, when such correction is necessary to bring out clearly the intention, which is indicated by a reasonable interpretation of the drawings and specifications as a whole.

3.29.2 The Owner/Project Manager may from time to time prepare for his own use estimates of quantities or bills of materials required for the work. Copies of such estimate or bills of materials which may be given to the Contractor for his convenience, or any lists, weights, or quantities of materials or structures which may appear on the drawings shall not be considered as finally correct, sufficiently complete, or accurately covering any portion or all the work to be done under this Contract. Such bills or estimates may be carefully assembled and prepared, but their accuracy

is not guaranteed. They may or may not be accurate as to any particular detail and are given only as the best information available at the time of issue of the information. It is mutually understood that any such lists or estimates are furnished to the Contractor for his convenience only and not as lists or estimates of work to be done, many necessary items of work being omitted.

3.30 **ENGINEER TO DIRECT WORK AND ORDER ALTERATIONS, MODIFICATIONS, DELETIONS**

3.30.1 The Owner/Project Manager shall have the right but not obligation to direct the manner in which all work under this Contract shall be conducted in so far as may be necessary to secure the safe and proper progress and the specified quality of the work, and all work shall be done and all material shall be furnished to the satisfaction and approval of the Owner/Project Manager.

3.30.2 Additional drawings and explanations to exhibit or illustrate details may be provided by the Owner/Project Manager and shall be so provided whenever necessary and shall be binding upon the Contractor. The written decision of the Owner/Project Manager as to the true interpretation and meaning of the drawings and specifications and of such additional drawings and explanations shall be binding upon the Contractor.

3.30.3 If at any time the Contractor's methods, materials, or equipment appear to the Owner/Project Manager to be unsafe, inefficient or inadequate for securing the safety of the workmen or the public, the quality of work or the rate of progress required, he may order the Contractor to increase their safety, efficiency and adequacy, and the Contractor shall comply with such orders. If at any time the Contractor's working force and equipment are, in the opinion of the Engineer, inadequate for securing the necessary progress, as herein stipulated, the Contractor shall, if so directed, increase the working force and equipment to such an extent as to give reasonable assurance of compliance with the schedule of completion. The failure of the Owner/Project Manager to make such demands shall not relieve the Contractor of his obligations to secure the quality, the safe conducting of the work, and the rate of progress required by the Contract, and the Contractor alone shall be and remain liable and responsible for the safety, efficiency, and adequacy of his methods, materials, working force, equipment and timely completion of job irrespective of whether or not he makes any change as a result of any order or orders received from the Owner/Project Manager.

3.30.4 The Owner/Project Manager shall have the power to make any alteration in, omissions from additions to the original specifications, drawings, designs and instructions that may appear to him to be necessary or advisable during the progress of the work and the Contractor shall be bound to carry out the work in accordance with any instructions that may be given to him in writing by the Owner/Project Manager and such alterations, omissions, additions or substitutions shall not invalidate the Contract. Any altered, additional or substituted work which the Contractor may be directed to do in the manner above specified as part of the work, shall be carried out by the Contractor on the same conditions in all respects on which he agreed to do the main work and at the same rates as are specified in the Contract for the main work, unless such alterations are not identical with items of work and form extra items.

3.30.5 The time for completion of the work shall be extended in the time proportion that the altered, additional or substituted work bears to the original contract and the decision of the Owner/Project Manager shall be conclusive and binding on the Contractor.

3.31 **CONTRACTOR'S SUPERVISION**

3.31.1 The Contractor shall, during the whole time the work is in progress, employ a qualified engineer to be in-charge of the works with adequate experience in handing of jobs of this nature and with the prior approval of the Owner/Project Manager. Such engineer shall be constantly in attendance at the site during working hours. During Contractor's representative's absence during working hours, when it may be necessary to give directions and orders by the Owner/Project

Manager or the Engineer, such orders shall be received and obeyed by the Contractor's engineer in-charge who may have charge of the particular part of the work in reference to which orders are given.

If requested to do so, the Owner/Project Manager or the Engineer shall confirm such orders in writing. Any directions, instructions or notices given by the Owner/Project Manager or the Engineer to Contractor's engineer-in-charge shall be deemed to have been given to the Contractor. Such engineer in-charge of Contractor shall have all necessary powers to engage labour or purchase materials and proceed with the work as required for speedy execution in accordance with the Contract.

Apart from the above, a separate and independent planning and monitoring cell of adequate and suitable back-up in the form of computers and project management software (Primavera preferred) shall also be available at site full time. This cell shall prepare overall and detailed construction programmes and submit weekly / fortnightly / monthly progress and hold-up reports.

3.31.2 None of the Contractor's Superintendents, engineers, supervisors or labour should be withdrawn from the work without due notice being given to the Owner/Project Manager or the Engineer; further no such withdrawals shall be made if in the opinion of the Owner/Project Manager or the Engineer such withdrawals will jeopardise the required pace of progress/successful completion of the work.

3.31.3 The Contractor shall employ in or about execution of the work only such persons as are careful, skilled and experienced in their respective trades, and the Owner/Project Manager shall be at liberty to object to and require the Contractor to remove any person employed by the Contractor in or about execution of works who in the opinion of the Engineer misconducts himself or is incompetent or negligent in the proper performance of his duties and all such persons shall not again be employed upon the works without the prior permission of the Owner/Project Manager.

3.31.4 Neither the Contractor, the Owner/Project Manager nor the Engineer shall hire or employ any employee of the other party except by mutual consent.

3.32 **SETTING OUT WORKS**

3.32.1 The Contractor shall set out the works and shall be responsible for the true and perfect setting out of the same and for the correctness of the positions, levels, dimensions and alignment of all parts thereof. If at any time, any error shall appear during the progress of any part of the work, the Contractor shall at his own expenses rectify such error, if called upon, to the satisfaction of the Owner/Project Manager.

3.32.2 The Contractor shall establish and maintain base lines and benchmarks adjacent of the various sections of work. All such marks and stakes must be carefully preserved by the Contractor, and in case of their destruction by him or any of his employees, they will be replaced at the Contractor's expense.

3.32.3 The Contractor shall be responsible for the accuracy of all dimensions within the various sections of the work according to the figures of dimensions on the drawings.

3.33 **CONSTRUCTION SUPERVISION AND WORKMANSHIP**

3.33.1 The Owner/Project Manager will engage his own supervisory staff at the site of works as may be deemed fit. The Contractor shall afford the supervisors every facility and assistance for examining the works and materials for checking and measuring the works and materials. The supervisors shall have no power to revoke, alter, enlarge or relax any requirement of the Contractor, but may

sanction any day work, additions, alterations, deviations or omissions, or any extra work whatever as may be authorised by the Owner/Project Manager.

3.33.2 The Supervisors engaged by Owner/Project Manager will act Engineer's representatives and shall have power to give notice to the Contractor or to his Foreman of non-approval of any work or materials, and such work shall be suspended or the use of such material shall be discontinued, until the decision of the Engineer is obtained.

3.33.3 The work shall be conducted under the general direction of the Engineer and is subject to inspection by his supervisors to ensure strict compliance with the terms of the Contract. No failure of the Engineer or his supervisors during the progress of the work to discover or to reject materials, or work not in accordance with the requirement of this Contract shall be deemed as acceptance thereof or a waiver of defects therein and no payment by the Engineer on partial or entire occupancy of the premises shall be construed to be an acceptance of the work or materials which are not strictly in accordance with the requirements of this Contract. No changes whatsoever to any provision of the specifications shall be made without written authorisation of the Owner/Project Manager.

3.33.4 The Contractor shall execute the whole and every part of the work in the most substantial and workman-like manner as regards material and in all other respects.

3.33.5 If it shall appear to the Owner/Project Manager or the Engineer that any work has been executed with unsound, imperfect or unskilled workmanship, or that any materials or articles provided by him for the execution of the work are unsound, or of a quality inferior to that contracted for, or otherwise not in accordance with the Contract, the Contractor shall on demand in writing from the Owner/Project Manager or the Engineer, notwithstanding that the same may have been inadvertently passed, certified and paid for, forthwith rectify or remove and reconstruct such work in whole or in part as the case may require or as the case may be, remove such materials or articles at his own proper charge and cost. In the event of his failing to do so within seven days of receipt of the Engineer's written notice thereof, or any other period mentioned in such notice, the Engineer may rectify or remove and re-execute the work or remove and replace with other materials and articles complained of, as the case may be, at the risk and expense of the Contractor in all respects.

Also in the event the Contractor fails to carry out the rectification within the period stipulated above, the Contractor shall be liable to pay compensation at the rate of quarter (1/4) percent of the total Contract Value, for every week or part thereof, beyond the period stipulated above, that the rectification work remain incomplete.

3.33.6 The provisional acceptance of sections of the work for the purpose of preparing partial estimates and the payment of money for such partial estimates shall not operate as a waiver of any portion of this Contract and shall not be construed so as to prevent the Engineer from requiring replacement of defective work that may become apparent after the said provisional acceptance and shall not be construed in any way as the basis for a claim of extra compensation for any cause whatsoever by the Contractor.

3.34 UNFIXED MATERIALS WHEN TAKEN INTO ACCOUNT TO BE THE PROPERTY OF OWNER/PROJECT MANAGER

3.34.1 Wherein any certificate, of which the Contractor has received payment, the Engineer has included the value of any unfixed materials intended for and/or placed on or adjacent to the works, such materials shall become the property of the Owner/Project Manager (for any loss or damage to materials the Contractor shall be responsible) and they shall not be removed from the site, except for the works, without the written authority of the Owner/Project Manager.

3.35 **INTOXICANTS**

3.35.1 The Contractor shall not permit or suffer the introduction or use of intoxicating liquor upon the works embraced in this Contract, or upon any of the ground occupied or controlled by him.

3.36 **WORK IN MONSOON AND DEWATERING**

3.36.1 The construction and erection work may entail working in monsoon also. The Contractor must maintain a minimum labour force as may be required for the job and plan and execute the construction and erection according to the prescribed schedule. No extra rate will be considered for such work in monsoon.

3.36.2 During monsoon and other period it shall be the responsibility of the Contractor to keep the construction site free from accumulating of water, at his own cost.

3.36.3 During inclement weather, rains, Contractor shall suspend concreting for such time as the Engineer may direct and shall protect from damage all works already in progress or completed just then. All such temporary protective measures shall be at Contractor's cost and any damage to works shall be made good by the Contractor at his own expense. Upon resumption with Engineer's consent/notice, Contractor shall make good any deterioration or defect in or loss of the Works or Materials, which has occurred during the suspension.

3.37 **HOLD HARMLESS CLAUSE**

3.37.1 The Contractor shall be fully responsible for the due compliance by him and his Sub-contractors with all statutory requirements and with all applicable labour laws including Contract Labour Abolition and Regulation Act, Workmen's Compensation Act, P.F./E.S.I., Labour welfare fund, Act as may be applicable to the Contractor, the Sub-contractors and their employees. The Contractor shall fully indemnify and save harmless the Owner/Project Manager from and against all claims, demands, expenses, losses, liabilities, charges, actions, suits and proceedings whatsoever including claims under aforesaid Acts and laws which may be brought or made against the Owner/Project Manager, its Officers or servants by reason or in consequence of any matter or thing done or omitted to be done by the Contractor and/ or the Sub-contractors and all costs, charges and expenses which may become payable by the Owner/Project Manager in respect thereof.

3.38 **DEMOBILISATION**

3.38.1 Upon completion of work, the Contractor shall promptly demobilise from the site and leave the place in a manner as directed by the Owner/Project Manager or the Engineer, including cleaning of the area. Contractor shall start demobilisation only after the successful completion of the contract. No equipment, plant material or personnel shall be de-mobilised from the site unless with the express consent of the Owner's Project Manager. The Owner reserves the right to disallow in de-mobilisation if works under this scope of this contract are not completed to his satisfaction.

4.0 INSURANCE

4.1 **Rented Equipment**

All construction equipment shall be brought to and kept at the Site at the sole cost, risk and expense of Contractor, and Owner/Project Manager shall not be liable for any loss or damage thereto, except to the extent any such loss or damage is caused solely by the Owner/Project Manager. Contractor shall maintain adequate, appropriate and prudent insurance with respect to such construction equipment.

Any Insurance policy carried by the Contractor, any Sub-contractor or any third party on or in respect of any construction equipment shall provide for waiver of the underwriter's right to subrogation against Owner/Project Manager, the Financing parties, their assignees, subsidiaries, parent companies, affiliates, employees, insurers and underwriters. Contractor shall obtain adequate insurance to cover all construction equipment rented or leased from third parties.

4.2 **Statutory Insurance Benefits**

Contractor shall maintain with respect to the Work to be done under the Contract, in each applicable jurisdiction, all statutory insurance benefits and other insurance required by law including, without limitation, unemployment Insurance.

4.3 **Third Party Insurance**

Contractor shall at its sole expense, in the joint names of Owner/Project Manager and Contractor prior to the commencement of any Work on the Site, pursuant to the Contract, obtain adequate insurance, against liability for damage or death of or personal injury occurring before Final Performance Acceptance to any Person (including any employee of the insured parties) or to any property due to or arising out of the performance or non performance of the Work by Contractor or any Sub-contractors and other third party liabilities on account of obstruction, loss of amenity, trespass, nuisance or advertising pursuant to the Contract.

4.4 **Automobile Liability Insurance**

Contractor shall, at its sole expense and in the joint names of Owner/Project Manager and Contractor, shall maintain automobile liability insurance covering all owned, non-owned and hired automobiles, trucks and other vehicles used by Contractor or its Sub-contractors in connection with the Work.

4.5 **Insurance against Accident, etc. to Workmen and Other Insurances**

Contractor shall, at its sole expense, insure and shall maintain Insurance as required by Workmen Compensation Act or any other Acts applicable in India and all other Applicable Laws for all actions, suits, claims, demands, costs, charges and expenses arising in connection with the death of or injury to any person employed by Contractor or its Sub-contractors for the purpose of the performance of the Work. Contractor shall also maintain Contractor's All Risk (CAR) insurance.

In addition, Contractor shall obtain and maintain all other Insurances required to be obtained and maintained by it for fulfilling all his obligations under the Contract including Insurances against damages to designs and the like arising out of Services.

4.6 **General Insurance Requirements**

All insurance obtained by Contractor shall be maintained with an insurer approved by the Owner/Project Manager.

On or prior to the Commencement Date of Contract, Contractor shall furnish to the Financing Parties and Owner/Project Manager certificates of Insurance (or if one of the Financing parties, Owner/Project Manager or Owner's Representative so directs, copies of the actual insurance policies signed by an authorised Representative of the insurer) from each Insurance carrier showing that the above required Insurance is in force, the amount of the carrier's liability there under, and further providing that the Insurance will not be cancelled, changed or not renewed until the expiration of at least 90 (ninety) Days (to the extent obtainable under commercially reasonable terms) after written notice of such cancellation, change or non-renewal has been received by Owner/Project Manager and the Financing Parties and Contractor. All policies and

certificates of Insurance affected in accordance with this clause shall be in form and content acceptable to Owner/Project Manager and Financing Parties.

4.7 **Remedy on Failure to Insure**

If Contractor fails to effect and keep in force the Insurance for which it is responsible under the Contract, Owner/Project Manager may effect and keep in force any such Insurance, and pay such premiums as may be necessary for that purpose, and from time to time, after issuance of a reimbursement request thereof accompanied by relevant supporting documentation, deduct the amount so paid by Owner/Project Manager from any amounts due or which may become due to the Contractor under the Contract.

4.8 **Descriptions not Limitations**

The Insurance coverage referred to in this clause 4.0 shall be set forth in full in the respective policy forms, and the foregoing descriptions of such policies are not intended to be complete, nor to alter or amend any provision of the actual policies and in matters, if any, in which the said description may be conflicting with such instruments, the provisions of the policies of the Insurance mutually agreed by the Parties shall govern; provided, however, that neither the content of any Insurance policy or certificate nor Owner/Project Manager's approval thereof shall relieve the Contractor of any of its obligations under the Contract.

4.9 **Fire Insurance**

Unless otherwise instructed by the Owner/Project Manager, the Contractor shall on signing the Contract insure the works and keep them insured until the completion of the Contract against loss or damage by fire with a company to be approved by the Owner/Project Manager, in the joint names of the Owner/Project Manager and the Contractor for such amount and for any further sum if called upon to do so by the Owner/Project Manager, the premium of such further sum being allowed to the Contractor as an authorised extra. Such policy shall cover the property of the Owner/Project Manager only and shall not cover any property of the Contractor or of any of his approved Sub- Contractor or employees. The Contractor shall deposit the policy and receipts for the premiums with the Owner/Project Manager within twenty-one days from the date of signing the Contract unless otherwise instructed by the Owner/Project Manager. In default of the Contractor not insuring as provided above, the Owner/Project Manager /Owner's Representative on his behalf may so insure and may deduct the premiums paid from any money due, or which may become due to the Contractor. The Contractor shall, as soon as the claim under the policy is settled, or the work reinstated by the Insurance Office should they elect to do so, proceed with all due diligence with the completion of the works in the same manner as though the fire had not occurred and in all respects under the same conditions of Contract. The Contractor, in case of rebuilding or reinstatement after fire, shall be entitled to such extension of time for completion, as the Owner/Project Manager may deem fit.

Notwithstanding the above, the Contractor shall provide adequate portable fire extinguishers in his work area and take all adequate precautions against fire hazard and train regularly his supervisors/workmen in firefighting techniques.

In the event of occurrence of any fire being attributable in the opinion of the Owner/Project Manager /Owner's Representative to the Contractor's negligence, no extension of time will be granted.

4.10 **Damages to Persons & Property Insurance in Respect of**

4.10.1 The Contractor shall be responsible for all injury to persons, animals or things, and for all damage to the structural and/or decorative part of property which may arise from the operations or

neglect of himself or of any of his approved Sub-contractor or of any of his or his approved Sub-contractor's employees, whether such injury or damage arises from carelessness, accident or any other cause whatever in any way connected with the carrying out of this Contract. The Contractor shall indemnify the Owner/Project Manager and hold him harmless in respect of all and any losses arising from any such injury or damage to person or property as aforesaid and also in respect of injury or damage under any applicable laws and also in respect of any award of compensation or damages consequent upon a claim in relation to such injury by a third party.

The Contractor shall have to cover personal third-party insurance as per labour law/statuary requirements/applicable laws of state Government per person per incident. Third party insurance for damage to surrounding property shall be maintained by the Contractor per labour law/statuary requirements/applicable laws of state Government.

4.10.2 The Contractor shall reinstate at his cost all damages of every sort mentioned in this clause, so as to deliver the whole of the Contract Works complete and perfect in every respect and so as to make good or otherwise satisfy all claims for damage to the property of third parties.

4.10.3 The Contractor shall indemnify the Owner/Project Manager against all claims which may be made against the Owner/Project Manager by any member of the public, or other third party in respect of anything which may arise in respect of the works or in consequence thereof and shall at his own expense arrange to effect and maintain, until the completion of the Contract with an approved nationalised insurance company, a Policy of Insurance in the joint names of the Owner/Project Manager and the Contractor against such risks and deposit such policy or policies with the Engineer from time to time during the currency of this Contract. The Contractor shall also indemnify the Owner/Project Manager against all claims which may be made upon the Owner/Project Manager, whether under the Workmen's Compensation Act or any other Statute in force during the currency of this Contract or at common law in respect of any employee of the Contractor or any of his approved Sub-contractor and shall at his own expense effect and maintain, until the completion of the Contract, with an approved nationalised insurance company, a Policy of Insurance in the joint names of the Owner/Project Manager and the Contractor against such risks and deposit such Policy or Policies with the Engineer from time to time during the currency of this Contract.

The Contractor shall be responsible and liable to the Owner for all losses, which may be excluded from the Insurance Policies above referred to and also for all other damage to any property arising out of or incidental to the negligent or defective carrying out of this Contract.

4.10.4 The Contractor shall also indemnify the Owner/Project Manager in respect of any costs, charges or expenses arising out of any claim or proceedings and also in respect of any award of compensation of damage arising on account of the above.

4.10.5 The Owner/Project Manager or the Engineer shall be at liberty and is hereby empowered to deduct the amount of any damages, compensation costs, charges and expenses arising or accruing from or in respect of any such claim or damage from any sum due or to become due to the Contractor.

4.10.6 The Owner/Project Manager or the Engineer shall not be responsible or be held liable for any damage to person or property consequent upon use, misuse or failure of any construction tools and equipment used by the Contractor or any of his Sub-contractors even though such construction tools and equipment be furnished, rented or loaned to the Contractor or his Sub-contractors by the Owner/Project Manager. The acceptance and/or use of any construction tools and equipment by the Contractor or his Sub-contractors shall be construed to mean that the Contractor accepts all responsibility for and agrees to indemnify and save harmless, the Owner/Project Manager or the Engineer from any and all claims for said damages resulting from

said use, misuse or failure of such construction tools and equipment for which the Owner/Project Manager may be liable.

5.0 FOSSILS, INSPECTION & TESTING

5.1 All fossils, coins, articles of value or antiquity, human remains and structures and other remains or things of geological or archaeological or religious or artistic interest or monetary value discovered on the Site shall be the property of the Owner/Project Manager, except as required under applicable law. The Contractor shall take reasonable precautions to prevent his staff, labour or other persons from removing or damaging any such article or thing. The Contractor shall, immediately upon discovery of such article or thing, advice the Owner/Project Manager or Owner's Representative

5.2 **Inspection and Testing**

5.2.1 Contractor shall perform all inspection, expediting and quality surveillance as may be required for performance of the Services. Contractor's responsibilities under this sub-clause shall include, without limitation, inspecting all supplies, Materials and equipment that comprise or will comprise the Relevant Package or that are to be used in performance of the Works.

5.2.2 The Contractor shall at its own expense carry out at the place of manufacture and/or on the site carry out all such tests &/or inspections of the plant & equipment and any part of the facilities as are specified in the contract. The Contractor shall carry out the inspection and quality control aspects as set out in Technical Specification. In the event the Owner/Project Manager establishes that the Contractor is not carrying out all such inspection and quality control aspects, the Owner/Project Manager has the right to appoint at Contractor's cost third party inspection agencies.

5.2.3 The Contractor shall obtain from any relevant third party or manufacturer any necessary permission or consent to enable the Owner/Project Manager (or their designated representatives) to attend the test and/or inspection. Contractor / Contractor's third party inspection agency shall perform such detailed inspection of all work in progress at intervals appropriate to the stage of design, engineering, procurement, fabrication, construction, erection, testing, Commissioning, start-up or Tests before Provisional Acceptance as is necessary to ensure that such work is proceeding in accordance with the Contract, the Documents, Applicable Laws, Applicable Permits, Good Engineering Practices and Prudent Electricity Industry Practice and to protect Owner/Project Manager against defects and deficiencies in such work (including any which would diminish or void the ability of Owner/Project Manager or Contractor to realise upon any manufacturer's or supplier's warranty or under any applicable insurance coverage). On the basis of such inspections, Contractor shall keep Owner/Project Manager continuously informed of the progress and quality of all work, whether performed by Contractor or any Sub-contractor, and shall provide Owner/Project Manager with Written reports which shall contain notwithstanding anything to the contrary contained herein defects and deficiencies revealed through such inspections and of measures proposed by Contractor to remedy such defects and deficiencies. Owner/Project Manager or Owner's Representative shall have the option, at Owner's /Project Manager's expense, of being present at all such inspections, and the Contractor shall give notice of all such inspections agreed.

5.2.4 In the event that the progress and quality of the work is not proceeding in accordance with the Contract, Owner/Project Manager or Owner's Representative shall be entitled to make recommendations to Contractor or any Sub-contractor for the purpose of remedying such failure and any such defects and deficiencies or variances. Any inspection performed or not performed by Owner/Project Manager hereunder shall not be a waiver of any of Contractor's obligations under the Contract or be construed as an approval or acceptance of any of the work or Services

hereunder or absolve the Contractor in any manner of its liabilities, responsibilities and obligations under the Contract.

5.2.5 The Contractor shall, where required give due notice to the Owner/Project Manager/Owner's Representative whenever such work is ready before covering up or putting out of view. The Owner's Representative shall then either carry out the inspection, examination, measurement or testing or notify the Contractor that it is considered unnecessary.

5.2.6 The Owner's Representative shall have the right to re-inspect any work though previously inspected and approved by him at the Site, before and after the same are erected. If by the above inspection the Owner's Representative rejects any work, the Contractor shall make good for such rejections either by replacement or modifications/ repairs as may be necessary to the satisfaction of the Owner's Representative.

5.2.7 The Owner/Project Manager and the Owner's Representative shall be entitled, during design, engineering, manufacture, fabrication and preparation at any places where work is being carried out, to inspect, examine and test the materials and workmanship, and to check the progress in the performance of the work at no extra cost to the Owner/Project Manager. The Contractor shall give all reasonable facilities and assistance, including access to Documents to carry out such inspection, examination, measurement and testing. All inspection and tests shall be in line with approved Inspection & Test Plans and Owner/Project Manager/Owner's Representative shall carry out necessary inspection as per the Contract. Should any inspected work or service fail to conform to the Contract, the Owner/Project Manager may reject such work or service and the Contractor shall either replace or make alterations necessary to meet Contract requirements free of cost to the Owner/Project Manager. The Owner/Project Manager's right to inspect, test, and where necessary, reject the work or service shall in no way be limited or waived by reason of any part of the work having previously been inspected, tested and passed by the Owner/Project Manager or Owner's Representative.

5.2.8 The Contractor shall agree, with the Owner/Project Manager/Owner's Representative about the time and place for the testing of any equipment / Materials and other parts of the Works as specified in the Contract. The Contractor shall give 15 (fifteen) Days' notice for inspection of indigenous Materials and 30(thirty) days for Offshore Materials. The Owner/Project Manager/Owner's Representative shall give the Contractor not less than 24 (twenty-four) hours' notice of his intention to attend the Tests. The Contractor shall provide sufficient suitably qualified and experienced staff to carry out the Tests specified in the Contract. The Contractor shall present to the Owner/Project Manager/Owner's Representative the calibration certificates of all the testing and measuring instruments proposed to be used for carrying out the Tests. In case the Owner/Project Manager/Owner's Representative is not satisfied with the calibration certificates, the Contractor shall arrange to get the concerned instrument(s) recalibrated to the satisfaction of the Owner/Project Manager/Owner's Representative.

5.2.9 If the Owner's Representative does not attend at the time and place agreed, or if the Contractor and the Owner's Representative agree that the Owner's Representative shall not attend, the Contractor may proceed with the Tests, unless the Owner's Representative instructs the Contractor otherwise. Participation by Owner/Project Manager or Owner's Representative in or their absence from or failure to participate in any Tests (other than the Performance Tests) shall not relieve or absolve the Contractor from any Guarantee or Warranty or obligations of Services under or in pursuance of the Contract.

5.2.10 The Contractor shall promptly forward to the Owner/Project Manager/Owner's Representative duly certified reports of the Tests.

5.2.11 If the Owner/Project Manager/Owner's Representative requires such equipment, materials, design or workmanship to be re-tested, the Tests shall be repeated under the same terms and

conditions. Contractor shall undertake an additional testing of any material, equipment or the work, if the Owner/Project Manager/Owner's Representative believes the results of earlier Tests are not accurate or do not establish the true condition to specification of equipment, material or work being tested. If such retesting demonstrate that the work, equipment or material being so tested conforms to the requirements of Contract, then Owner/Project Manager shall bear the cost of such additional Test and the cost of any required uncovering and covering the Goods or Services and shall grant the extension of time for completion, if necessary. If however such retesting confirms Owner/Project Manager/Project Manager's conclusion and cause the Owner/Project Manager to incur additional costs, such costs shall be recoverable from the Contractor by the Owner/Project Manager and may be deducted by the Owner/Project Manager from any monies due, or to become due, to the Contractor. Neither the failure by Owner/Project Manager/Owner's Representative to discover defects, nor any payment to Contractor in respect of the Tests, shall prejudice the rights of Owner/Project Manager thereafter to require and obtain from Contractor the performance of the Services in accordance with the Contract herewith. Owner/Project Manager/Project Manager shall not be deemed to have accepted any Services as a result of any additional testing.

5.3 **Rejection**

If, as a result of inspection, examination or testing, the Owner/Project Manager/Owner's Representative decides that any works, equipment, system, materials, design or workmanship has failed in such inspection, examination or tests or is defective or otherwise not in accordance with the Contract, the Owner's Representative may reject such Works, equipment, system, materials, design or workmanship and shall notify the Contractor promptly, stating his reasons. The Contractor shall then promptly correct or replace, such item or portion so as to pass retesting and otherwise meet and conform to such requirements. Following any such rejection, all expenses reasonably incurred by the Owner/Project Manager in consequence of such re-testing or inspection shall be borne by the Contractor. No changes to project schedule or increase in the contract price shall be granted with respect to such additional testing. Contractor shall solely bear any cost resulting there from.

6.0 CONTRACT PRICE AND PAYMENT:

6.1 **Contract Price**

Subject to the full and complete performance of the Works and in full consideration to the Contractor for all costs incurred in connection therewith, the Owner shall pay, and the Contractor shall accept, in accordance with the Contract, the Contract Price as stated in the Schedule of Price inclusive of all taxes. Such sum may not be adjusted except as set forth in the Contract. Unless otherwise stated in the Contract, the Contract Price covers all the Contractor's obligations under the Contract and all things necessary for the proper design, execution and completion of the Works and the remedying of any defects.

The Contractor shall be deemed to have satisfied himself of the correctness and sufficiency of the Contract Price having examined the Pre-Effective Date Conditions and all the data, information made available in the tender to its satisfaction.

In case of any discrepancies in the Contract Price, the following rules shall prevail:

a) Where there is discrepancy between words and figures, the Contract Price as stated in words shall prevail.

b) Where the total of values of individual line items do not match the total Contract Price in the Price Schedule, the total Contract Price value shall prevail. The individual line-item values shall be adjusted to match the total Contract Price value.

6.2 **Pre-Effective Date Conditions**

The Contractor has had sufficient opportunity to investigate and make a careful examination, survey and inspection of and has investigated and made a careful examination, survey and inspection of the Pre-Effective Date Conditions and has satisfied itself as to the feasibility of executing the Contract Works at the Site. The "Pre-Effective Date Conditions" shall consist of the following:

- the Site and surrounding areas and to have satisfied itself as to the condition of and circumstances affecting the Site (including but not limited to soil, surface, subsurface, environmental, geological, seismic, geotechnical, climatic, hydrological conditions and the existence of underground obstructions, fossils, antiquity structures, archaeological remains, and the general and local conditions with respect to waste disposal, handling and storage of Equipment, availability and quality of utilities, location of underground utilities, and equipment and facilities needed prior to and during performance of all the Contractor's obligations under the Contract);
- the availability and condition of methods of transporting the Equipment and Contractor's Equipment to the Site and the suitability and availability of access routes to the Site (including the availability and condition of roads);
- the local ambient conditions based upon previous ambient data;
- the qualifications of all Sub-contractors;
- all other difficulties, hazards and other matters that may affect the Contractor's performance.

The Contractor specifically acknowledges and accepts the Pre-Effective Date Conditions and agrees that the Contract Price shall not be increased and Guaranteed Completion Date shall not be extended, in each case as a result of any Pre-Effective Date Condition. Without prejudice to the Contractor's obligations under the Contract, the Contractor shall solely be responsible for any misunderstanding or incorrect information that the Contractor obtained and relied on.

Where the Contractor wishes to have other access or intrude on to or over land adjoining the Site, then arrangements must be made by the Contractor and such access or intrusion will be entirely at the Contractor's risk and cost. The Contractor shall keep the Owner informed in respect of negotiations for any such arrangements and the Owner's consent shall be required for any such arrangements.

6.3 **Taxes & Duties**

The Contractor shall be responsible for and shall administer and pay all other taxes including stamp duty and all sales, use, gross receipts, and other similar taxes and contributions imposed by any taxing authority upon the sale, purchase or use of the equipment and on all services or labour carried out in relation to the Contract Works, as well as taxes on or measured by the Contractor's income or taxes on or measured by wages earned by employees of the Contractor or any Sub-contractor or any taxes or contributions in the nature of workman's compensation, social security, old age benefits or similar items based upon or relating to employment of workers by the Contractor or any Sub-contractor. The Contractor shall furnish to the appropriate taxing authorities all required information and reports in connection with such taxes.

Notwithstanding the foregoing above, the Owner shall not be required to reimburse the Contractor for any taxes to the extent such taxes are payable as a result of the Contractor's or any Sub-contractor's failure to follow or comply with available procedures for the exemption from or abatement of such taxes.

The Owner shall have the right to deduct or set-off any monies in respect of any taxes or levies or any withholding tax charged to the Owner which should be attributable to the Contractor under this Clause from any payment to be made by the Owner to the Contractor under the Contract.

The Contractor shall be responsible for the payment of any taxes, duties, levies or imposts imposed in relation to any surplus materials and Contractor's Equipment which he / his contractor removes from site.

The Contractor shall indemnify, save harmless and defend the Owner, its directors, officers, employees and agents against all and any liabilities, claims and charges (including any penalties, fines, fees and like) arising in connection with the matters referred to in above clauses.

7.0 COMMENCEMENT, DELAYS AND EXTENSIONS OF TIME

7.1 Notice to Proceed

Contractor shall commence performance of Work on the Effective Date of the Contract or any other date which the Owner/Project Manager specifies (the "Commencement Date") through a Notice to Proceed (the "Notice to Proceed") delivered for commencement of the Work, which shall not be earlier than the date of issue of the Notice to Proceed. Unless specifically agreed otherwise in the Contract, the Effective Date of the Contract shall also be reckoned as the Commencement Date.

7.2 Commencement of the Work

Contractor will commence the Work as per the Effective Date / Commencement Date indicated in the Letter of Intent (LOI) or a Letter indicating a Notice to Proceed (NTP) date and/or the Effective Date / Commencement date as mentioned in the Contract.

7.3 Contractual Time for Completion

7.4 All the Works under the Contract shall be completed and shall have successfully passed the Tests before Take-over within the time for completion as set forth in the specification failing which the Contractor shall pay to the Owner/Project Manager for such delay in Relevant Package Completion (the "Delay Liquidated Damages"). Payment of any Delay Liquidated Damages shall not affect or prejudice in any way or manner Owner/Project Manager's right to terminate the Contract nor shall any termination of Contract prejudicially affect the Owner/Project Manager's right to recover any accrued Delay Liquidated Damages or release the Contractor from any obligation for payment thereof.

The Contractor agrees that the work shall be commenced and carried on at such points and in the order of precedence and at such times and seasons as may be directed by the Owner/Project Manager in accordance with the schedule for completion of the work as outlined elsewhere in the Contract. The Contractor declares that he has familiarised himself with the site and rights-of-way, with all the local conditions, and with all the circumstances which may, or are likely to affect the performance and completion of the work, and that he has allowed for such conditions. However, if a time schedule is submitted by the Contractor so as to keep the phasing of work generally in line with the time schedule drawn up and to keep the components unchanged, such time schedule after approval from the Owner/Project Manager, shall be accepted and complied with by the Contractor and it shall form a part of the Contract. The progress of work will be checked at regular monthly intervals and the percentage progress achieved should be commensurate with the time elapsed after the award of the Contract.

7.5 Extension of Time for Completion

7.5.1 If the Contractor shall desire an extension of time for completion of work on the grounds of his having been unavoidably hindered in its execution or any other ground, he shall apply in writing to the Owner/Project Manager within 7 days of the date of hindrance on account of which he desires such extension as aforesaid. This application shall invariably be accompanied by sufficient documentation giving reasons for seeking such extension. No application for such extension shall be entertained if it is not received in sufficient time to allow the Owner/Project Manager to consider it and the Contractor shall be responsible for the consequences arising in relation thereto. Upon receipt, Owner/Project Manager may accept or reject such application.

7.5.2 In the event of a disruption (other than suspension by Owner/Project Manager) to the Schedule and if in the opinion of Contractor it is not the responsibility of Contractor or its any Sub-contractor and which might have been caused due to action of any third parties which Contractor might not have reasonably prevented, and that Contract entitles Contractor to time extension and I or other relief from Owner/Project Manager, the Contractor shall notify the Owner/Project Manager within twenty four (24) hours and provide a written report (to the best of Contractor's knowledge at the time) of the disruption within 72 (Seventy Two) Hours of Contractor's learning of the disruption and such report shall be supplemented on a prudent, informative and timely basis thereafter not later than 14 (Fourteen) Days from the date of Contractor's first learning of such disruption. In such an event the Contractor may modify and resubmit for approval to Owner/Project Manager/Owner's Representative computer-based network schedule and modifications if any required to the Schedule. Upon receipt, Owner/Project Manager shall take reasonable action in accordance with the Contract.

7.5.3 Contractor in any case has to inform to Owner immediately upon learning of any possible hindrances to the Works which have caused or may cause delay or other impact to the Works to enable Owner take suitable action.

7.5.4 No necessity for an extension of time is anticipated but if untoward or extraordinary circumstances beyond the control of the Contractor should arise, which in the opinion of the Owner/Project Manager should entitle the Contractor to a reasonable extension of time, such extension may be granted but shall not operate to release the Contractor from any of his obligations, other than in relation to payment of liquidated damages for such delay (only to the extent of the extension granted by the Owner/Project Manager. For purpose of this clause, untoward and extraordinary circumstances are defined under clause 17.0 hereinafter. Under above circumstances, only extension of time may be granted but the Contractor will not be entitled to any additional compensation. In case of strike or lockout, the Contractor shall, as soon as possible, give written notice to the Owner/Project Manager, but the Contractor shall nevertheless constantly use his endeavours to prevent delay and shall do all that may reasonably be required to the satisfaction of the Owner/Project Manager to proceed with the work.

7.6 The Owner/Project Manager shall have the right to order discontinuance/suspension of the work, in whole or in part, for such time as may be necessary in the opinion of Owner. In such an event, the Owner/Project Manager will grant such extension of time for completion of the Contract which in its opinion is proper and/or other relief in accordance with Contract in consequence of such delay.

7.6.1 **Resumption of Work**

After receipt of permission or of instruction to proceed, the Contractor shall, after notice to the Owner/Project Manager, and together with the Owner's Representative, examine the Works and Materials affected by the suspension. The Contractor shall make good any deterioration or defect in or loss of the Works or Materials, which has occurred during the suspension. The Work after resumption shall be started by the Contractor within 7 (seven) Days of receipt of permission or instruction to proceed.

7.7 **Rate of Progress**

7.7.1 If, at any time, the Contractor's actual progress falls behind the Schedule in any manner or it becomes apparent that it will so fall behind, the Contractor shall submit to the Owner/Project Manager / Owner's Representative a revised programme taking into account the prevailing circumstances. The Contractor shall, at the same time, notify the Owner/Project Manager / Owner's Representative of the steps being taken to expedite progress, so as to achieve completion within the time for completion stipulated under the Contract, including in particular the Schedule and the Guaranteed Completion Dates. The Contractor may also be asked to modify the plan, as a result of the changed circumstances due to delay, in order to complete the Work in time.

7.7.2 If any steps taken by the Contractor in meeting his obligations under this sub clause no. 7.7 cause the Owner/Project Manager to incur any additional costs, such costs shall be recoverable from the Contractor by the Owner/Project Manager and may be deducted by the Owner/Project Manager from any monies due, or that may become due, to the Contractor under the Contract or otherwise.

7.8 **Non-Performance by Contractor**

7.8.1 If the Contractor, except on account of any legal restraint upon the Owner/Project Manager, is preventing the continuance of the work or in case of a certificate for interim payment not paid within the period for honouring certificate, shall suspend the Works or in the opinion of the Engineer shall neglect or fail to proceed with due diligence in the performance of his part of the Contract or if he shall more than once make default in respect of Scope of Contract, the Owner/Project Manager and/or the Engineer shall have the power to give notice in writing to the Contractor requiring that the Work be proceeded within a reasonable manner and with reasonable dispatch, such notice shall purport to be a notice under this clause. After such notice shall have been given, the Contractor shall not be at liberty to remove from the site of the Works or from any ground contiguous thereto any plant or materials belonging to him which shall have been placed thereon for the purpose of the Works and the Owner/Project Manager shall have a lien upon all such plant and materials to subsist from the date of such notice being given until the notice shall have been compiled with. If the Contractor shall fail for 7 days after such notice has been given to proceed with the Works as therein prescribed, the Owner/Project Manager may proceed as provided in Clause 13.2 hereinafter.

7.8.2 If the Contractor fails to perform as per the expectations of the Owner/Project Manager and consistently fails to achieve intermediate milestones as mentioned in the contract or fails to proceed with due diligence in the performance of his part of the contract or fails to make such due progress as would enable the works to be completed within period agreed, then in addition to the action proposed in clause 13.2 hereinafter, the Owner/Project Manager shall take recourse as per the following clause 7.8.3:

7.8.3 After giving 7 days' notice of non-performance to the Contractor, as per clause 13.2 hereinafter, the Owner/Project Manager shall be at liberty to remove items or part of the scope of the works of this contract and get the same executed by third party at the Contractor's risk and cost. The Owner/Project Manager has the right to recover the cost difference between the actual amount spent by the Owner/Project Manager in getting these works executed by third party and the amount that would have been payable to the Contractor at the quoted rates of this contract.

7.9 **WORK PARTLY ABANDONED**

7.9.1 If any time after commencement of the work, the Owner shall for any reason whatsoever, not require the Partly work thereof as specified in the Contract to be carried out, the Engineer shall give notice in writing of the fact to the Contractor who shall have no claim to any payment of compensation whatsoever on account of any profit or advantage which he might have derived

from the execution of the work in full but which he did not derive in consequence of the full amount of the work not having been carried out nor shall he have any claim for compensation by reason of any change having been made in the original specifications, drawings, designs and instructions which shall involve any curtailment of the work as originally contemplated.

7.9.2 The Contractor shall be paid the charges on the cartage only of materials actually brought to the site by the Contractor and rendered surplus as a result of the abandonment or curtailment of the work or any portion thereof and taken back by the Contractor, provided however, that the Engineer shall have in all such cases, the right to purchase these materials at their purchase price or at current local rates whichever may be less.

8.0 CERTIFICATE OF ACCEPTANCE / COMPLETION

8.1 Provisional Acceptance Certificate (PAC)

8.1.1 Provisional Acceptance of Works shall occur if and only if:

8.1.1.1 Completion of all the Works and successful completion of all Tests to the satisfaction of Owner/Project Manager in accordance the Scope of Work, Technical Specifications and Contract Documents.

8.1.1.2 Rectification of all punch list items other than those which are minor in nature (would not affect intended operation/use of the Works and can be attended to subsequently while the Works is put in operation and in use).

8.1.1.3 Owner/Project Manager/Owner's Representative determine that the Relevant Package is complete and can be legally, safely and reliably placed in commercial operation with a normal compliment of operating personnel,

8.1.1.4 The Relevant Package is in accordance with all Applicable Laws and all government approvals, Prudent Utility Practices and Good Engineering Practices.

8.1.1.5 All Permits required to operate and maintain the Relevant Package, which are to be obtained by Contractor, have been obtained.

8.1.1.6 Owner/Project Manager has received from Contractor:

(i) All Documents required under the Contract for Owner/Project Manager to operate and maintain the Relevant Package,

(ii) All special tools and other maintenance tools and tackles, if any, as per Contract.

8.1.1.7 Contractor has delivered to Owner/Project Manager a completion certificate certifying each of the above foregoing and Owner/Project Manager has accepted the same.

8.1.2 The Owner/Project Manager shall issue a Provisional Acceptance Certificate to the Contractor certifying the date of achievement of the last of the condition under clause 8.1.1 above upon which the Provisional Acceptance has occurred subject to Take-over of the Relevant Package has taken place. Any Liquidated Damages for delay accruing pursuant to the Contract for failure of the Relevant Package to achieve Provisional Acceptance by its Guaranteed Completion Date shall stop accruing as of the date specified in the Certificate of Provisional Acceptance.

8.1.3 On issuance of Provisional Acceptance Certificate, the Contractor shall handover to Owner/Project Manager, and the Owner/Project Manager shall Take-over such Relevant Package operating in its normal, steady-state, operating mode. Forthwith upon such Take-over, Owner/Project Manager shall be responsible, for the care, custody and operational control of the

Relevant Package. The Contractor's obligations towards Warranty and Latent Defects shall commence from the date of Provisional Acceptance Certificate of Relevant Package.

8.2 **Final Acceptance Certificate (FAC)**

8.2.1 Final Acceptance of Works shall occur if and only if:

8.2.1.1 Successful completion of Provisional Take Over of the Works

8.2.1.2 Contractor has completed all the Work including completion of all balance Punch List items in accordance with the Contract

8.2.1.3 Final Documents for operation and maintenance including 'As built' drawings are provided by the Contractor to the Owner/Project Manager as per the Contract

8.2.1.4 Contractor has delivered to the Owner/Project Manager a completion certificate certifying each of the foregoing and as under:

(i) All the Contractor's and Sub-contractor's personnel, supplies, unused Materials, waste, rubbish and temporary facilities located at or near such Relevant Package have been removed,

(ii) Final Acceptance has occurred for the Relevant Package and all other provisions of, and all items required by this Contract have been performed or delivered, as the case maybe, in accordance with this Contract and in a manner satisfactory to Owner/Project Manager.

(iii) All Sub-contractors have been paid the dues by the Contractor and no due certificates received from such Sub-contractor.

(iv) All statutory or legal liabilities on account of the work performed under the contract have been duly calculated and paid by the Contractor.

8.2.2 Upon certification by Contractor of completion of sub-clauses under clause 8.2.1.5 and acceptance of the certificate by the Owner/Project Manager, the Owner/Project Manager shall issue a Final Acceptance Certificate certifying such matters within 120 (one hundred and twenty) Days.

9.0 LIQUIDATED DAMAGES

9.1 **Liquidated Damages for Delay**

9.1.1 If Provisional Acceptance Certificate does not occur on or before the Guaranteed Completion Date of Relevant Package, Contractor shall pay Liquidated Damages to Owner/Project Manager for such delay for each and every week or part thereof which elapses after the Guaranteed Completion Date for the Relevant Package until the earlier of (i) Provisional Acceptance Certificate, or (ii) the Day on which Contractor has paid to the Owner/Project Manager the maximum amount of Liquidated Damages for delay pursuant to the Contract.

9.1.2 The Liquidated Damages payable by Contractor to the Owner/Project Manager is 0.5% of the Contract Price for every week or part thereof of delay of not achieving the intermediate milestones (to be arrived at during contract finalization), subject to a maximum of 5% of Contract Price per milestone (the "Liquidated Damages for Delay") and 1% of the Contract Price for every week or part thereof of delay of not achieving the final milestones subject to a maximum of 10 % of the Contract Price for the overall schedule.

9.1.3 Notwithstanding the foregoing, no Liquidated Damages for Delay shall be payable for period of delay in achieving Provisional Performance Acceptance beyond Guaranteed Completion Date of

the Relevant Package to the extent such delay is solely on account of Force Majeure Event and Contractor has been granted an extension of time pursuant to clause 17.0 hereof.

9.1.4 If at any time, the Contractor is falling behind the schedule for intermediate milestone/s, he shall take necessary action to make good for such delays as per various provisions in the Contract to ensure overall Project schedule and achieve the final milestone/s. In case the Contractor is able to achieve the final milestone/s by the Guaranteed Completion Date/s, the Liquidated Damages deducted for the delays in intermediate milestone/s shall thereon be refunded to the Contractor along with the final payment.

9.1.5 The Contractor shall pay to the Owner/Project Manager the Liquidated Damages for Delay calculated by Owner/Project Manager pursuant to the contract failing which same shall be adjusted from any sum due or payable by Owner/Project Manager to Contractor or recovered from performance and other securities provided by the Contractor.

9.2 **The Liquidated Damages for Failure to meet Performance Guarantees**

9.2.1 The Performance Liquidated Damages payable by the Contractor to the Owner/Project Manager which will be calculated as set forth in the Contract / Technical Specifications.

9.3 **Liquidated Damages Being Reasonable**

The Parties acknowledge that:

a) Damages for Contractor's failure to meet any Guaranteed Completion Date and/or Contractor's failure to achieve the Performance Guarantee, are difficult to determine and that the Liquidated Damages set forth in the Contract including clause no. 9.0 of these General Conditions of Contract are pre-determined, pre-agreed and appropriate measures of the damages for such delays or such shortfalls in performance and are neither penalty nor consequential damages sustained by Owner/Project Manager as a result of such delays and / or shortfalls. Payment of all Liquidated Damages pursuant to this clause 9.0 shall be subject to the limitation on liability in respect thereof set forth in clause 16.2 of these General Conditions of Contract.

b) Contractor waives any defence to non-performance of its obligation to pay Liquidated Damages pursuant to the Contract including this clause no. 6.0 on the ground of alleged invalidity or unenforceability of provisions relating to payment of Liquidated Damages based on any theory or law or otherwise.

c) The amount of Liquidated Damages specified herein represent the projected commercial losses of the Owner/Project Manager, are fair and reasonable, are not penalties and reflect the Parties' assessment and estimate of such financial losses and damages of the Owner/Project Manager.

9.4 In view of the foregoing, the Contractor accepts and agrees to such Liquidated Damages as liquidated damages and shall not dispute such Liquidated Damages in any proceedings under the Contract.

10.0 WARRANTIES

10.1 **Contractor Warranties**

Contractor warrants to Owner/Project Manager with respect to the Performance of Work that all construction equipment and materials comprising the Contract Works will be new, conforming to Technical Specifications and free from defective workmanship. If Owner/Project Manager notifies Contractor in Writing with adequate detail of any such defects or deficiencies in the Works

discovered during the applicable Defects Liability Period thereof, Contractor shall (a) re-perform any of the work hereunder to correct any errors, omissions, defects or deficiencies in the Works, and (b) in the case of any defective equipment or materials, at Contractor's option either repair or replace at its Cost.

Contractor warrants to Owner/Project Manager that:

a) Adherence to the Operations Manual shall allow operation and maintenance of the Relevant Package with performance at a level at least as favourable to Owner/Project Manager as the Performance Guarantees and such operation will not impair any Warranty in respect of Work including equipment and materials;

b) The Relevant Package supplied will incorporate all such modifications and improvements as their respective manufacturers may have decided to incorporate in similar equipment as of the date of Taking-Over and the end of the Defects Liability Period, provided that the incorporation of such modifications and improvements may take place at such time during the Defects Liability Period as the parties may agree;

c) Not Used.

d) All information, averments and data submitted, starting from the Bid and up to end of Contract Period, to the Owner/Project Manager is correct and true. If at any later date, any of the aforesaid information, averment and data submitted is found to be false or incorrect, in part or in whole, the Contractor would be treated as a Contractor in Default as per Clause 13.2, and all consequences shall apply accordingly. The Owner/Project Manager would also be entitled to recover any cost or damages from Contractor including through encashment/forfeiture of Contract Performance Bank Guarantee and deductions from amounts payable to the Contractor.

10.2 **Defects Liability Period (also referred as Warranty Period)**

10.2.1 "Defects Liability Period" shall be 24 (twenty-four) months (unless a different Warranty Period is specified in either SCC or Technical Specifications in which case the Warranty Period as specified in Technical Specification / SCC shall have the precedence in the order of priority giving priority to Technical Specifications followed by SCC) beginning from the date of Provisional Acceptance / Take-over whichever is later of the Relevant Package. During this Warranty Period, the Contractor will be liable to rectify all defects in the Relevant Package if any arisen.

Component/sub-systems/parts wherein specific warranty longer than the Warranty Period for the Relevant Package is specified in the either the Technical Specifications or SCC, such extended warranty requirements of the identified component/sub-systems/parts as specified in the Technical Specifications / SCC (in the order of priority) shall prevail.

Any parts or components of the Goods or Services forming the Relevant Package having defects which is warranted and corrected by Contractor either by way of repair or replacement shall be further warranted by Contractor for a further period equivalent to the Warranty Period from the date such correction is affected and accepted by Owner/Project Manager/Owner's Representative.

Notwithstanding the above, in no event shall the warranty on any part or component exceed twice the contracted Warranty Period from the date of Provisional Acceptance (the "Sun-set Date").

Notwithstanding the Sun-set Date, where a recurring defect of any particular part or component results in the failure of such part or component more than twice within the appropriate Sun-set Date, such part or component shall be replaced or repaired by the Contractor until such time that

such part or component has operated without failure at least once for the contracted Warranty Period from the date of installation of such replaced / repaired part.

The above Warranties are however subject to the provision that should any scheduled inspection of a particular item of the Relevant Package falls due within the above Defects Liability Period and any part or component thereof is scheduled to be refurbished or replaced, then such parts are warranted only up to the date of such scheduled replacement or refurbishment. The refurbished or newly replaced parts shall thereafter be covered for under the terms and conditions agreed by the Parties with respect to such replaced or refurbished parts.

10.2.2 **Latent Defects Liability Period**

The Latent Defects Liability Period for the Relevant Package shall be 36 (thirty-six) months from the expiry of the Warranty Period for the Relevant Package, however, not less than sixty (60) months from the date of Provisional Acceptance of the Relevant Package. Any such Latent Defects identified during the appropriate Latent Defect Liability Period shall be corrected and made good by the Contractor at its sole Cost.

Should any scheduled inspection of a particular item of the Relevant Package fall due within the Latent Defects Liability Period and any part or component thereof is scheduled to be refurbished or replaced, then the warranty for such parts shall be limited up to the date of such scheduled replacement or refurbishment. The refurbished or newly replaced parts shall from this point onwards be covered for under the terms and conditions agreed by the Parties with respect to such replaced or refurbished parts.

10.2.3 **To Remedy Defective Work During Defects / Latent Defects Liability Period**

If the Work or any portion thereof shall be damaged in any way excepting by the acts of the Owner/Project Manager, or if defects not readily detected by proper inspection shall develop before the Provisional Acceptance Certificate, the Contractor shall forthwith make good, without compensation from the Owner/Project Manager, such damage or defects in a manner satisfactory to the Owner/Project Manager / Owner's Representative. In no case shall defective or imperfect work be retained.

In case any defects in the work due to bad materials and/or bad workmanship develop in the work before the expiry of this period, the Contractor on notification by the Owner/Project Manager shall rectify or remedy the defects at his own cost and he shall make his own arrangements to provide materials, labour, equipment and any other appliance required in this regard. The retention of Security Deposit/Performance Bank Guarantee by the Owner/Project Manager during this Defects Liability Period shall be as indicated in Special Conditions of Contract. In case even on due notification by the Owner/Project Manager, the Contractor fails to rectify or remedy the defects, the Owner/Project Manager shall have the right to get this done by other agencies and recover the cost incurred, by deductions from any money due or that may become due to the Contractor or from his security deposit/ Performance Bank Guarantee.

The Owner/Project Manager may, in lieu of such amending and making good by the Contractor, deduct from any money due to the Contractor or from his security deposit Performance Bank Guarantee, a sum to be determined by the Owner/Project Manager equivalent to the cost of amending such work and in the event of such security deposit/ Performance Bank Guarantee being insufficient, recover the balance from the Contractor together with any expense the Owner/Project Manager may have incurred in connection therewith.

The Contractor shall remain liable under the provisions of this clause notwithstanding the passing by the Owner/Project Manager of any certificate, final or otherwise or the passing of any accounts.

Owner/Project Manager shall give notice of observed defects promptly following such observation. Such notice must be given at the latest within thirty (30) Days from the end of the appropriate Warranty Period or Latent Defect Liability Period as applicable.

Contractor's obligation to effect repairs or replacement based on Contractor's Warranties shall not extend to failure caused by:

a) normal wear and tear;

b) failure to adhere to the Operation and Maintenance Manual; or

c) any repair or modification initiated or undertaken by Owner/Project Manager during the Warranty Period without the proper recourse to Contractor and without the Contractor's knowledge or consent, which consent shall not be denied unreasonably.

10.3 **Sub-contractor Warranties**

No warranty obtained from any Sub-contractor shall be deemed to reduce or limit Contractors Warranties or Latent Defects liability set forth in this clause 10.0 or Contractor's obligation to supply Goods or perform corrective work.

10.4 **Survival of Warranties**

Warrantees and Latent Defect Liability under the contract shall survive any termination of the Contract in respect of any part of the work for which Owner/Project Manager has paid Contractor.

10.5 **Emergency Repairs**

In the event of repairs carried out by the Contractor during the Defects Liability Period is not found satisfactory, the Owner/Project Manager reserves the right to rectify / replace the part at Contractor's risk and Costs.

In the event of an emergency where Contractor's personnel is not available on Site or cannot be on Site within an acceptable period of time and if in the judgement of Owner/Project Manager the delay from giving formal notice would cause serious loss or damage which could be prevented by immediate action, defects may be corrected by Owner/Project Manager or a third party designated by Owner/Project Manager at the Contractor's cost and expense, without giving prior notice to Contractor. In the event such action is taken by Owner/Project Manager, Contractor will be notified promptly and shall assist wherever possible in undertaking the necessary corrections. The above emergency repairs shall not relieve the Contractor from liability under the terms and General Conditions of Contract.

10.6 **Removal of the Defective Work**

If the defect or damage is such that it cannot be remedied expeditiously at the Site, the Contractor may, with the consent of Owner/Project Manager/Owner's Representative, remove from the Site for the purposes of repair any part of the Works which is defective or damaged. If the value of part or material removed from the Site is substantial (value to be finalised at appropriate stage) as determined by the Owner/Project Manager/Owner's Representative, the Contractor shall provide security in the form of bank guarantee for a value as determined by the Owner/Project Manager/Owner's Representative.

In case of defective parts which are not repairable at Site but are essential for commercial operation of the equipment, Contractor and the Owner's Representative shall mutually agree to a program of replacement or renewal which will minimise interruptions to the maximum extent, in the operation of the equipment and the Relevant Package and the Contractor shall expeditiously provide necessary parts for replacement before shutdown planned.

The cost of any special or general overhaul rendered necessary during the warranty period due to defects in Relevant Package or defective Work carried out by the Contractor, the same shall be borne by the Contractor.

11.0 INTERIM AND FINAL PAYMENTS

11.1 The Contractor's organisation shall maintain an independent estimate & billing division. Contractor shall be responsible for working out the detailed quantities for various items of work, from the progressive drawings, released for construction, within two months from the date of receipt of drawings. Detailed bill of quantities along with the abstract shall be submitted to the Engineer for his approval. Increase or decrease in these approved quantities due to revision in drawings or due to Engineer's instructions shall be incorporated by the Contractor and submitted to the Engineer for revised approval within 30 days from the receipt of revised drawings/instructions.

11.2 Bills are to be submitted in the format approved by the Owner/Engineer. Interim / Final bills shall be submitted on the basis of work completed against these approved quantities. Payment will be released by the Owner on verification of work completed against these approved quantities. No other method for billing shall be accepted by the Owner. Each bill shall be submitted along with the detailed measurement sheets, pour cards, reconciliation statements for all the materials issued by the Owner.

11.3 Running Account bill shall be monthly and in computerised format prepared in Microsoft Excel or any other mutually agreed software and uploaded in Owner's e-sourcing portal. The bills shall be error free and accompany all the supporting documents like JMRs, quality related documents, pour card, etc. The bill shall be submitted in soft copy (non-rewritable CDs) also.

11.4 Any interim payments shall be regarded as payments by way of advance against the final payment only and not as payments for work actually done and completed and shall not preclude the right of Owner/Project Manager or the Engineer from getting bad, unsound and imperfect or unskilled work to be removed and reconstructed by the Contractor or be considered as an admission of the due performance of the Contract or any part thereof in any respect or the accruing of any claim nor shall it conclude, determine or affect in any way the powers of Owner/Project Manager or the Engineer under these conditions or any of them as to the final settlement and adjustment of the payment or otherwise, or in any other way vary or affect the Contract.

11.5 A bill shall be submitted by the Contractor each month on or before the date fixed by the Owner for all works executed in the previous month and Owner shall take or cause to be taken the requisite measurement for the purpose of having the same verified. If the Contractor does not submit the bill within the time fixed as aforesaid, the Engineer at its discretion may depute within seven days of the date fixed as aforesaid a subordinate to measure the said work in the presence of the Contractor whose counter signature to the measurement list will be sufficient warrant and the Engineer may prepare a bill from such list which shall be binding on the Contractor in all respects. If the Contractor fails to countersign or to record the differences within a week from the date of measurement in the manner required by the Engineer then in any such event, the measurements taken by the Engineer or by the subordinate deputed by him as the case may be, shall be final and binding on the Contractor and the Contractor shall have no right to dispute the same.

11.6 The final bill shall be submitted by the Contractor within two months of the date of the Final Acceptance Certificate, otherwise the Engineer's certificate of the measurement and the total amount payable for the work accordingly shall be final and binding on all Parties.

11.7 The Contractor shall submit all bills in printed forms / Owner's e-sourcing portal as directed by Owner and the charges in the bills shall always be entered at the agreed rates as per the Contract

or in the case of any extra work ordered in pursuance of these conditions and not mentioned or provided for in the Contract at the rates subsequently accepted by the Owner for such work.

11.8 In case work is nearly or is anticipated to be suspended, or in case only unimportant progress is being made, or in case it is apparent that the Contractor is about to forfeit his Contract or that the money yet due to him will not complete his Contract, the Engineer may, at his discretion, withhold any payment which may be due to the Contractor.

11.9 The Contractor shall not demand, nor be entitled to receive payment for the work any portion thereof except, in the manner set forth in this Contract and only after the Engineer shall have given a certificate for such payment. For final payment, when the Work covered by this Contract has been completed, and Final Acceptance Certificate has been issued to the Contractor, the Contractor shall prepare a final abstract showing the total amount of work done and its value under and according to the terms of this Contract. The Contractor shall attach copies of the Engineer's completion certificate with his final abstract. From the total value thus arrived, all previous payments will be deducted and all deductions made in accordance with the provisions of this Contract and the remainder shall be paid by the Owner to the Contractor within three months of the date of submission of the Contractor's final bill except in case of disputed items.

11.10 **Deduction from / Withholding Contractor's Bills/Payment**

11.10.1 All costs, damages or expenses, which the Owner/Project Manager may have paid, for which under the Contract the Contractor is liable, will be claimed by the Owner/Project Manager. All such claims shall be billed by the Owner/Project Manager 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 properly identify such claims. Such claims shall be paid by the Contractor within 15 (fifteen) Days of the receipt of the corresponding bills and if not paid by the Contractor within the said period, the Owner/Project Manager may the deduct the amount, from any monies 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/Project Manager of such claims.

11.10.2 Owner/Project Manager shall have the right to withhold from any payment due to Contractor, including the final payment, such amounts as Owner/Project Manager reasonably deems necessary or appropriate to protect it because of any one or more of the following reasons:

a) Defects in any Work, which might affect Owner/Project Manager's ability to operate Relevant Package as contemplated herein, whether or not payment has been made thereof;

b) The filing of any vendor / tradesman's lien or similar encumbrance in respect of the Work or the Relevant Package (or any portion thereof);

c) A dispute as to the accuracy or completeness of any request for payment received by Owner/Project Manager within 90 Days of receipt thereof or payment made there under;

d) Contractor's failure to deliver any Performance Securities to Owner/Project Manager

e) Any requirement in accordance with Applicable Laws to withhold any Taxes payable by Contractor in respect of the Goods/Work or any part thereof;

f) Contractor's failure to make payments to its Sub-contractors or Workers for Work or supply of Goods or to any statutory & Regulatory authority including amounts withheld by Contractor because of disputes between Contractor and such Persons.

g) Any legal cases, litigations pending against the Contractor or against the Owner/Project Manager but relating to the Works or Contractor's obligations under the Contract.

h) Any breach of the Contract by the Contractor.

11.10.3 In addition to the provisions of the clause 11.10.1 which relates to the recovery by the Owner/Project Manager of any amounts that the Owner/Project Manager may have paid, for which the Contractor is liable under the Contract, the Owner/Project Manager shall also be entitled to recover all the dues in terms of the Contract including Liquidated Damages for delay, Liquidated Damages for the shortfall in the guaranteed performance parameters, etc., by way of deductions from the payments due to the Contractor or that may become due to the Contractor in future or from any securities / guarantees under the Contract and / or otherwise.

11.10.4 Notwithstanding any dispute that Contractor may have, and regardless of the basis thereof or grounds thereof, Contractor agrees that it will, for so long as the Contract has not been terminated diligently proceed with the Works up to Final Performance Acceptance and final Take-over of Relevant Package, all in accordance with the terms of the Contract.

11.10.5 Any payment due to Owner/Project Manager by the Contractor and remaining unpaid beyond the stipulated date shall be liable to interest payment 100 (hundred) basis points above the short-term Prime Lending Rate of State Bank of India Marginal Cost of the Fund-Based Lending Rate (SBI MCLR) for a tenure of 1 year from the date of due to Owner/Project Manager to the date of receipt of dues from Contractor by Owner/Project Manager.

11.10.6 Idle time charges for any reason whatsoever shall not be borne by the Owner.

11.11 **Punch List Items:**

Contractor shall perform all Work required or appropriate for all Punch List Items within a Schedule to be mutually determined by Contractor and Owner/Project Manager after submission of the Final Request for take-over. Such Schedule shall provide for completion of all Punch List Items as soon as practicable following determination of the completion schedule, but no later than the date set forth by Owner/Project Manager. Upon completion of the Punch List Items, Contractor may submit to Owner/Project Manager and the Owner's Representative a Request for Final Take-over and shall furnish with such a request a certificate that all Punch List Items have been completed. Owner/Project Manager shall examine and certify claim of Contractor of having satisfactorily attended the punch list items.

11.12 **Dedicated Bank Account / Escrow Account:**

11.12.1 The Contractor shall maintain a separate account with a Scheduled Commercial Bank for the purpose of receiving all the payments under the Contract and for utilization of payments received from the Owner for disbursement to its sub- contractors. This could be an Escrow Account opened and governed under a tripartite agreement between the Contractor, the Owner and the Bank if required by the Owner / Project Manager.

The Contractor shall maintain separate books of accounts for all payments under this Contract and Owner/Project Manager shall have access to these books of accounts at all times.

11.12.2 Account Tracking Mechanism:

In case the contractor wants to withdraw funds from the above bank account for any purpose other than the contract, he shall be required to submit an undertaking to the project manager certifying that all due statutory payments, labour payments and payments to all his sub-contractors have been disbursed corresponding to the total payment received by him under the contract

11.12.3 For tracking of payments received from the employer, the Contractor shall also submit a monthly statement by 7th of every month certifying the transactions pertaining to the above account along with the purpose of such transactions. In case, the Contractor transfers the funds for any purposes

other than the Contract, without prior consent of the Owner, it will constitute a breach of Contract by the Contractor

11.12.4 In case the Contractor violates any of the above provisions, Owner shall have the right to give suitable instructions to the bank to regulate/ freeze the account.

12.0 CHANGE ORDERS

A Change Order shall be issued by the Owner/Project Manager in accordance with this clause, when either Owner/Project Manager or Contractor proposes to make any change in the Scope, Services, the Contract Price, the Performance Guarantees and/or the Schedule.

12.1 **Further Detailing not a Change Order**

Contractor's performance of Services shall be subject to further detailing from time to time and Contractor shall receive no additional compensation for such detailing to the extent that such detailing does not constitute a Change Order.

Notwithstanding GCC, no change made necessary because of any default of the Contractor in the performance of its obligations under the Contract shall be deemed to be a Change, and such change shall not result in any adjustment of the Contract Price or the Time for Completion.

12.2 **Right to Change Order**

12.2.1 Change Orders may be initiated by the Owner/Project Manager/Owner's Representative at any time during the Contract Period, either by instruction or by a request (the "Change Order Notice") to the Contractor to submit a proposal. If the Owner/Project Manager/Owner's Representative requests the Contractor to submit a proposal and subsequently elects not to proceed with the change, the Contractor shall not be reimbursed for the Cost incurred for proposal.

12.2.2 The Contractor shall not make any alteration and/or modification of the Services unless and until the Owner/Project Manager/Owner's Representative instructs or approves a Change Order in Writing.

12.2.3 Change Orders may be requested by the Contractor (the "Change Order Request") (i) in case its performance of Services is affected by any Change in Laws or any act or omission of the Owner/Project Manager, Owner's Representative or Owner/Project Manager's Other contractors, or (ii) to propose any change which in the Contractor's opinion will reduce the cost of constructing, maintaining or operating the Relevant Package or otherwise be of benefit to the Owner/Project Manager. Provided further that any Change Order Request under sub-para (i) of this clause, the Contractor shall give a written notice promptly but, in any event, not later than 15 days from the date of occurrence of the event failing which Owner/Project Manager shall not be liable for admitting such Change Order Request.

12.3 **Change Order Procedure**

12.3.1 If the Owner/Project Manager/Owner's Representative issues a Change Order Notice, the Contractor shall submit a proposal addressing the following, within fifteen (15) Days or any other period as mutually agreed:

a) Description of the proposed design and/or work to be performed, and a programme for its execution together with supporting details and calculations;

b) The Contractor's proposal for any necessary modifications to the Schedule

c) The Contractor's proposal for any adjustment to the Contract Price, Guaranteed Completion Dates, Performance Guarantees and/or modifications to the Contract.

12.3.2 If the Contractor issues a Change Order Request, the Contractor shall submit a proposal addressing the following:

a) the reasons for the request with supporting details/documents;

b) a description of the design and/or work affected or proposed to be performed, together with programme for execution and other supporting details/calculations;

c) the Contractor's proposal for any necessary modifications to the Schedule;

d) the Contractor's proposal for any adjustment to the Contract Price, Guaranteed Completion Dates, Performance Guarantees and/or modifications to the Contract.

12.3.3 The Owner/Project Manager/Owner's Representative shall respond with approval, rejection or comments within a period to be mutually agreed after receipt of such proposals.

12.3.4 If the Owner/Project Manager/Owner's Representative instructs or approves in Writing a Change Order, the parties shall proceed with adjustments to the Contract Price, Schedule of Payments, Performance Guarantees and/or Guaranteed Time for Completion.

12.3.5 Contractor shall not suspend performance of this Contract during review and negotiation of any Change Order, except as may be directed by Owner/Project Manager or required by Applicable Law.

12.3.6 Payment in respect of the approved Change Orders shall be released by the Owner/Project Manager to the Contractor on satisfactory completion of such Change Order and its certification by the Owner's Representative in the same manner as applicable to corresponding milestone payments under the Contract.

12.4 **New Items / Extra Items**

12.4.1 New Items / Extra items if any shall be paid on cost plus basis. The cost of item shall be determined as per the actual cost incurred (bills produced) for only he direct materials, labour, machinery utilisation for the said extra items subject to the cost / bills produced to be reasonable as per the prevailing market rates. The Contractor shall be paid 15 (fifteen) percent of the cost so derived towards the overheads and profits. These overhead & profit charges shall be deemed to include all the site infrastructure and management related costs e.g. construction power/water, project management, safety & PPE, general tools & tackle, employee accommodation etc. and shall not form part of any cost breakdown structure. Cost of materials will not be added for calculation of overheads/profits to the extent provided as a free issue material by the Owner/Project Manager. For such extra items, the Contractor shall maintain time sheets of personnel engaged and logbook of machinery utilisation for execution of such items and get them certified by the Owner/Project Manager. Only such labour and equipment cost as supported with the above records, which in the opinion of the Owner/Project Manager is reasonable and justified, shall be taken into account to determine the extra item rate.

12.4.2 Analogous items not covered in the Schedule of Price / Quantities but are of similar construct or nature to the items already covered in the Schedule of Price / Quantities shall be paid for at rates worked out on the basis of cost breakup of rates already agreed for such similar items already covered in the Schedule of Price / Quantities. The Contractor shall furnish a cost break-down structure of all the major items (using the Pareto principle) under the Contract execution matching the agreed rates at the beginning of the Contract. This cost breakdown of items -up shall form the basis of deriving the price for the analogous items.

13.0 TERMINATION BY THE OWNER/PROJECT MANAGER

13.1 **Termination for Convenience**

The Owner/Project Manager shall be entitled to terminate the Contract at the Owner/Project Manager's convenience, at any time by giving thirty (30) Days prior notice to the Contractor. Such notice of termination shall specify that termination is for Owner/Project Manager's convenience and the date upon which such termination becomes effective. Upon receipt of such notice, the Contractor shall proceed as follows:

(i) cease all further work, except for such work as may be necessary and instructed by the Owner/Project Manager/Owner's Representative for the purpose of making safe or protecting those parts of the Services already executed, and any work required for leaving the Site in a clean and safe condition;

(ii) stop all further sub-contracting or purchasing activity, and terminate all Sub-contracts except those to be assigned to the Owner/Project Manager pursuant to paragraph (vi) below;

(iii) handover and transfer the title of ownership to the Owner of all Design, Documents, Manuals equipment, materials and spares relating to the Relevant Package prepared by the Contractor or procured from other sources up to the date of termination for which the Contractor has received payment equivalent to the value thereof;

(iv) handover and transfer the title of ownership to the Owner of those parts of the Relevant Package executed by the Contractor up to the date of termination; and

(v) remove all Contractor's Equipment, which is on Site and repatriate all his staff and labour from the Site.

(vi) to the extent legally possible, assign to the Owner/Project Manager all rights, title and benefit of the Contractor to the Relevant Package as on date of termination and, as may be required by the Owner/Project Manager, in any sub-contracts concluded between the Contractor and its Sub-contractors.

Upon termination, the Contractor shall:

a) Cease all further Work, except for such Work as may be necessary and instructed by the Owner/Project Manager/Owner's Representative for the purpose of making safe or protecting those parts of the Works already executed, and any Work required to leave the Site in a clean and safe condition,

b) Handover and transfer the title of ownership to the Owner all Design Documents, Construction Documents, Manuals, equipment, Materials and spares for which the Contractor has received payment,

c) Hand over and transfer the title of ownership to the Owner those other parts of the Works executed by the Contractor up to the date of termination, and

d) Remove all Contractor's equipment, which is on the Site and repatriate all his staff and labour from the Site.

e) to the extent legally possible, assign to the Owner/Project Manager all rights, title and benefit of the Contractor to the Relevant Package as on date of termination and, as may be required by the Owner/Project Manager, in any sub-contracts concluded between the Contractor and its Sub-contractors.

The Owner/Project Manager shall return the initial Advance Bank Guarantee and Contract Performance Security, (except to the extent required for the surviving obligations of the Contractor) and shall pay the Contractor an amount calculated and certified in accordance with clause 17.6 and Sub-contractor cancellation charges if any.

13.2 **Termination for Default by Contractor**

13.2.1 Notice to Correct

If the Contractor fails to carry out any of his obligations, or if the Contractor does not execute the Services in accordance to the Contract, the Owner/Project Manager/Owner's Representative may give notice to the Contractor requiring him to make good such failure. The Contractor shall remedy the same or take reasonable action to remedy the same within fifteen (15) Days from date of such notice.

If the Contractor:

a) fails to comply with a notice under sub-clause 13.2.1, or

b) abandons or repudiates the Contract, or

c) without reasonable excuse fails to commence or proceed with the Services in accordance with the Contract, or

d) becomes bankrupt or insolvent, goes into liquidation, has a receiving or administration order made against him, compounds with his creditors, or carries on business under a receiver, trustee or manager for the benefit of his creditors, or if any act is done or event occurs which (under any Applicable Law) has a similar effect to any of these acts or events, or

e) assigns the Contract without the required consent of Owner/Project Manager, or

f) fails to comply with Applicable Laws and/or Applicable Permits, or

g) is in material breach of the Contract,

h) fails to comply with Tata Power's Safety Terms & Conditions annexed as Appendix to this GCC

then the Owner/Project Manager may, without prejudice to any other right or remedy Owner/Project Manager may have under the Contract after having given thirty (30) Days' notice to the Contractor, terminate the Contractor's employment under the Contract, should Contractor fail to rectify within such notice period or commence to rectify the defaults within fifteen (15) Days of receipt of such notice from Owner/Project Manager; provided always that in the case of paragraph (d) above, the termination shall become effective on Owner/Project Manager issuing the notice of termination.

Without prejudice to the foregoing, the amount of Liquidated Damages for Delay for which the Contractor would be otherwise become liable under clause 9.1 exceeds the aggregate cap referred to in clause 16.2.1 (i), then Owner shall at any time thereafter be entitled (but not obliged) by notice forthwith to terminate the employment of the Contractor

Upon termination, Owner/Project Manager shall automatically without the necessity of any further action by the Contractor stand subrogated to the interests of Contractor in or under any Sub-contracts. Owner/Project Manager shall succeed Contractor in all Sub-contracts and the Owner/Project Manager shall compensate the Sub-contractors under such Sub-contracts the compensation becoming due and payable under their agreements with the Contractor from and after the date Owner/Project Manager decides to succeed to the interests of the Contractor. The Contractor shall simultaneously deliver all Documents relating to the Relevant Package prepared by the Contractor or procured from other sources up to the date of termination to the Owner/Project Manager. Upon termination, if requested by Owner/Project Manager, Contractor shall withdraw from the Site and shall remove as directed by Owner/Project Manager any debris or waste materials (including any hazardous substances) generated by Contractor in performance of the Services.

Owner/Project Manager may take possession of any and all materials, documents, purchase orders, correspondence and schedules that Owner/Project Manager deems necessary to

complete the Relevant Package. The Owner/Project Manager is also free to take possession of and use Contractor's Equipment at Site free of any cost. The rights and authorities conferred on the Owner/Project Manager and the Owner's Representative by the Contract shall not be affected by such termination.

The Contractor shall not be released from any of his obligations or liabilities accrued under the Contract. For the avoidance of doubt, the termination of the Contract in accordance with this clause shall neither relieve the Contractor of his accrued obligations for Warranty or Latent Defects or his accrued liability to pay Liquidated Damages for Delay and/or Performance nor shall entitle him to reduce the value of Contract Performance Security.

13.2.2 The Owner/Project Manager may upon such termination complete the Relevant Package himself and/or by employing any other contractor. The Owner/Project Manager or such other contractor may use for such completion such of the Documents made by or on behalf of the Contractor, Contractor's Equipment, Temporary Works, plant and materials as he or they may think proper. Upon completion of the Services, or at such earlier date as the Owner/Project Manager/Owner's Representative thinks appropriate, the Owner/Project Manager/Owner's Representative shall give notice that the Contractor's Equipment and Temporary Works will be released to the Contractor at or near the Site. The Contractor shall remove or arrange removal of the same from such place without delay and at his cost.

13.2.3 Upon termination, if Owner/Project Manager is of the opinion that he is not able to complete the Relevant Package himself or with the help of other contractors, then he may reject the incomplete Works. In such an event the Owner/Project Manager shall recover all money paid by the Owner/Project Manager to the Contractor for the incomplete /rejected Relevant Package. The Contractor shall also dismantle and dispose of the rejected/incomplete Works and also clear the Site at his cost. If he fails to do so, the Owner/Project Manager will dismantle and dispose of the rejected incomplete Relevant Package and clear the Site at Contractor's Cost and risk and recover all expenses incurred in this regard from the Contractor.

13.3 **Payment after Termination**

13.3.1 After termination under clause no. 13.2 above, the Contractor shall not be entitled to any further payment under the Contract, except that, if Owner/Project Manager completes the Relevant Package and the costs of completion are less than the Contract Price, the Owner/Project Manager shall pay Contractor an amount properly allocable to Services fully performed by Contractor prior to termination for which payment was not made to Contractor or a Sub-contractor, upon completion of the Relevant Package by Owner/Project Manager.

13.3.2 The Owner/Project Manager shall be entitled to recover from the Contractor the extra costs, if any, of completing the Works. In addition, Owner/Project Manager shall be entitled to exercise any rights or remedies available to Owner/Project Manager hereunder or at law or in equity.

14.0 INDEMNIFICATION

14.1 **General Indemnity**

14.1.1 Contractor shall fully indemnify, save & hold harmless, defend and keep indemnified Owner/Project Manager, Owner/Project Manager's shareholders, the Owner's Representative, and the directors, agents, officers and employees of the Owner/Project Manager (the "Owner's Indemnified Parties") from and against any and all claims, including reasonable legal costs, (collectively the "Damages") in respect of death or bodily injury or in respect to loss or damage to any property of Owner or any other third parties which arises out of or in consequence of the Contract whilst the Contractor has responsibility for the care of the Works to the extent resulting from Contractor's or any Sub-contractor's or their agents

or employees intentional act, negligence, or strict liability or omission in the performance of the Contract; provided that the foregoing obligation shall not apply to the extent the Owner's Indemnified Parties are negligent or strictly liable or to the extent such damages are caused by the intentional acts or omissions of the Owner's Indemnified Parties.

14.1.2 Owner/Project Manager shall fully indemnify, save & hold harmless and defend Contractor and its shareholders and the directors, agents and employees of the Contractor (the "Contractor Indemnified Parties"), from and against any and all claims, including reasonable legal costs, (collectively the "Damages") by third parties in respect of death or bodily injury or in respect to loss or damage to any property which arises out of or in consequence of the execution of the Project to the extent caused by Owner/Project Manager's or Owner's Other Contractor's strict liability, intentional act or omissions or negligence; provided that the foregoing obligation shall not apply to the extent the Contractor Indemnified Parties are contributory negligent or strictly liable or to the extent such damages are caused by the intentional acts or omissions of the Contractor Indemnified Parties.

14.2 **Specific Indemnification**

14.2.1 Contractor shall fully indemnify, save and hold harmless Owner/Project Manager Indemnified Parties from and against any claim, demand, liability, action, proceedings, cost or expense by any third party with respect to:

a) Failure of Contractor, any Sub-contractor or any of their respective Sub-contractors to comply with Applicable Laws and Applicable Permits, Prudent Utility Practices and Good Engineering Practices.

b) Failure of Contractor to make payments of taxes relating to Contractor's, any Sub-contractor's income or other taxes required to be paid by Contractor pursuant to this Contract irrespective of whether they are reimbursable or to be compensated under the terms of this Contract.

c) Any Hazardous Materials of Contractor, any Sub-contractor, or any of their respective Sub-contractors which has at any time been brought on and has been caused to be released thereof on or from the Site or for which any of them is responsible by law or in the Contract.

d) Failure of Contractor to protect the environment (both on and off the Site) in accordance / compliance with the applicable environmental laws along with its amendments/modifications from time to time.

14.2.2 Owner/Project Manager shall fully indemnify, save harmless and Contractor Indemnified Parties from and against Damages in favour of any third party with respect to:

a) Failure of Owner/Project Manager or any of its Other Contractors to comply with Applicable Laws and Applicable Permits.

b) Any Hazardous Materials of Owner/Project Manager, or any of its Other Contractors (other than Offshore Supply Contractor, Onshore Supply Contractor, and Onshore Services Contractor, and the Sub-contractors) has brought on and caused the release thereof from the Project Site.

14.3 **Intellectual Property (IP) Indemnification**

14.3.1 In performing the Services, Contractor shall not incorporate into the Relevant Package, or use in connection with the Relevant Package or the performance of the work, any materials, methods, processes, systems or service that involve the use of any confidential information, intellectual property or proprietary rights that Contractor does not have the right to use or incorporate or which may result in claims or suits against Owner/Project Manager, Contractor or any Sub-contractor arising out of claims of infringement of any third party, domestic or foreign patent rights, copyrights, other proprietary rights, or intellectual

property rights, licenses or agreements, or applications for any thereof, or rights of use of confidential information.

14.3.2 The Contractor shall retain the copyright and other Intellectual Property Rights in the Contractor's Documents and other design documents independently made by (or on behalf of) the Contractor. The Contractor shall be deemed to give to the Owner/Project Manager a perpetual non-terminable, non-exclusive, transferable royalty-free licence to copy, use and communicate the Contractor's Documents, including making and using modifications of them. This licence shall:

a) be valid throughout the actual or intended working life (whichever is longer) of the relevant parts of the Works,
b) entitle any person in proper possession of the relevant part of the Works to copy, use and communicate the Contractor's Documents for the purposes of completing, operating, maintaining, altering, adjusting, repairing and demolishing the Works, and
c) in the case of Contractor's Documents which are in the form of computer programs and other software, permit their use on any computer on the Site and other places as envisaged by the Contract, including replacements of any computers supplied by the Contractor.
d) be used for any other purposes related to the Relevant Package / Work.

14.3.3 Contractor shall fully indemnify and save harmless and defend the Owner Indemnified Parties from and against any and all damages or loss that the Owner's Indemnified Parties may suffer, incur or pay by reason of any claims or suits arising out of claims of infringement of any patent rights, copyrights or other intellectual property, proprietary or confidentiality rights with respect to equipment, designs, techniques, processes and information designed or used by Contractor or any sub-Contractor in performing the Work or supply of Goods hereunder or under the Sub-Contracts in any way incorporated in or related to the Project other than any such equipment, designs, techniques, processes and information provided by the Owner Indemnified Parties.

14.3.4 If, in any suit or claim relating to the foregoing, a temporary restraining order or preliminary injunction is granted, Contractor shall make every effort to secure the suspension of the injunction or restraining order. If, in any such suit or claim or any part, combination or process thereof, is finally held to constitute an infringement and its use is permanently enjoined, Contractor shall promptly make every reasonable effort to secure for Owner/Project Manager a license, at no Cost to Owner/Project Manager, authorising continued use of the infringing Goods or Work. If Contractor is unable to secure such license within a reasonable time so as to not affect the Project Contractual Time for Completion, Contractor shall, at its own expense and without impairing performance requirements, either replace the affected Goods or Work, or part, combination or process thereof with non-infringing components or parts or modify the same so that they become non-infringing.

14.3.5 Final payment to the Contractor by the Owner/Project Manager will not be made while any such suit or claim remains unsettled.

14.4 **Notice and Legal Defence**

14.4.1 Promptly after receipt by a party of any claim or Notice of the commencement of any action, administrative or legal proceeding, or investigation as to which the indemnities provided may apply, such Party shall notify the other Party in Writing of such fact provided that the failure of a Party to give any such Notice promptly shall not excuse the indemnifying party from its indemnification obligations hereunder except to the extent any such failure actually prejudices the indemnifying Party in the defence of such matters.

14.4.2 The indemnifying Party shall assume on behalf of the indemnified Party and conduct with due diligence and in good faith the defence thereof with counsel reasonably satisfactory to

the indemnified Party; provided that the indemnified Party shall have the right to be represented therein by advisory council of its own selection and at its own expense; and provided, further, that if the defendants in any such action include both the indemnifying Party and the indemnified Party and the indemnified Party shall have reasonably concluded that there may be legal defences available to it which are different from or additional to, or inconsistent with, those available to the indemnifying Party, the indemnified Party shall have the right to select separate counsel to participate in the defence of such action on its own behalf at the indemnifying Party's expense.

14.4.3 The indemnified Party shall, at the request of the indemnifying Party, provide all reasonably available assistance in the defence or settlement of any such claim, action, proceeding or investigation, and all reasonable costs and expenses incurred by the indemnified Party in connection with the defence or settlement of any such claim, action, proceeding or investigation shall be reimbursed by the indemnifying Party promptly upon demand thereof. The indemnified Party shall not settle or compromise any claim, action or proceeding without the prior Written consent of the indemnifying Party such consent not to be unreasonably withheld.

14.5 **Failure to Defend Action**

If any claim, action, proceeding or investigation arises as to which the indemnities provided may apply, and the indemnifying Party fails to assume the defence of such claim, action, proceeding or investigation, then the indemnified Party may at the indemnifying Party's expense contest or settle such claim.

14.6 **Survival: Expiration of Indemnity**

The provision of this Clause 14.0 shall survive final acceptance or the termination of this Contract; provided that neither Party shall have any indemnity obligations pursuant to this Clause 14.0 for any claim arising out of or resulting from events or circumstances occurring after the termination of this Contract or after the expiration of the Latent Defect Liability Period; and provided further that neither Party shall have any indemnity obligation pursuant to this Clause 14.0 unless notice of any such claim for indemnity by either Party is received by the indemnifying Party prior to the date that is three (3) years after the expiration of the Latent Defect Liability Period.

15.0 CONTRACTOR'S CARE OF THE WORKS

15.1 The Contractor shall take full responsibility for the care of the Works from the Effective Date until the date of issue of the Certificate of Take-over when responsibility shall pass to the Owner/Project Manager. If the Owner's Representative issues a Certificate of Take-over for part of the Works, the Contractor shall cease to be responsible for the care of that part from the date of issue of such Certificate of Take-over when responsibility shall pass to the Owner/Project Manager.

15.2 The Contractor shall take responsibility for the care of any outstanding Work or obligations which is required to be completed/ fulfilled prior to the expiry of the Contract Period, until the Owner's Representative confirms in Writing that such outstanding Work or obligation has been completed/fulfilled.

15.3 If any loss or damage happens to the Relevant Package, during the period for which the Contractor is responsible, the Contractor shall rectify such loss or damage, at his cost, so that the Works conform with the Contract. The Contractor shall also be liable for any loss or damage to the Works caused by operations carried out by the Contractor after the date of issue of the Certificate of Take-over until the expiry of the Contract Period in so far as such loss or damage is not covered under Insurance to be taken by the Owner/Project Manager for operation of Plant.

16.0 LIMITATION OF LIABILITY

16.1 **No consequential Damages, etc.**

Except for any specific liability which may be identified in the Contract and which may be payable hereunder, Contractor shall not be liable for any special, incidental, indirect, or consequential damages or any loss of business Contracts, revenues or other financial loss (or equivalents thereof no matter how claimed, computed or characterised) arising out of or in connection with the Performance of the Work or supply of Goods unless caused by Contractor's negligence or wilful misconduct. In addition, Owner/Project Manager shall have no liability or any special, incidental, indirect or consequential Damages for any loss of business Contracts, revenues or other financial loss arising out of this Contract.

16.2 **Limitation of Liability**

16.2.1 Contractor's liability under the Contract shall be limited to

(i) with respect to delay in achieving the Guaranteed Completion Dates, the Liquidated Damages for Delay shall be ten percent (10%) of the Contract Price.

(ii) with respect to shortfall in Performance Guarantees, the Performance Liquidated Damages shall be as stated in the SCC/Technical Specifications;

16.2.2 Not used

16.2.3 Payment of the above Liquidated Damages for Delay shall not affect or prejudice in any way or manner, the Owner/Project Manager's right to terminate the Contract and also any termination of Contract shall not prejudicially affect the Owner/Project Manager's right to recover any accrued Liquidated Damages for Delay or release the Contractor from any obligation for payment thereof.

16.3 **Maximum Liability**

The Contractor's aggregate liability under or arising out of or in connection with this Contract, its performance or breach shall be limited to the Contract Price. This limitation of liability shall, however, exclude:

a) Losses, damages, or claims arising out of wilful misconduct, misrepresentations, negligence, sabotage, fraudulent and/or corrupt acts of the Contractor's or any Sub-contractor's or their agents in the performance of the Contract.
b) General indemnification, specific indemnification, IP indemnification pursuant to provisions under Clause 14.0 and sub-clauses thereunder.
c) Indemnities pursuant to Clause 1.11.2 or any other indemnity provisions under the Contract.

16.4 **Exclusive Remedies**

The Owner/Project Manager's and Contractor's remedies and liabilities that are identified in this Contract shall be the sole and exclusive remedies available to the Parties in respect of matters to which they are said to relate in this Contract irrespective of any rights and remedies which might be available at common law, in tort (including negligence), by statute or otherwise.

17.0 FORCE MAJEURE

17.1 **Definition of Force Majeure**

"In this Clause, "*Force Majeure"* shall mean an event or circumstance beyond the reasonable control of the Owner/Project Manager or the Contactor which could not have been foreseen, prevented or mitigated by such Party using its reasonable diligence and which

makes it impossible for such Party to perform the whole or in part its obligations under the Contract, including but not limited to:

a) Act of God;

b) An act of war, (whether declared or undeclared) hostilities invasion, armed conflict or an act of foreign enemies, blockade, embargo, revolution, military action, or sabotage.

c) Contamination by radioactivity from any nuclear fuel, or from any nuclear waste from the combustion of nuclear fuel, radioactive toxic explosive, or other hazardous properties.

d) Riot, civil commotion, terrorism or disorder, unless solely restricted to employees of the Contractor or of his Sub-contractors.

e) National or regional industrial disputes or targeted disputes which are part of national or regional campaign, and which is not reasonably within the powers of a Party to prevent, or which is not specific to the Party or any of his Contractors or Sub-contractors.

f) Operation of the forces of nature such as earthquake, hurricane, lightning, tidal wave, tsunami, typhoon or volcanic activity.

g) Any epidemic / pandemic to the extent declared as Force Majeure by respective local administrative / statutory body to the extent directly impacting the affected parts of the Contract.

17.2 **Excused Performance**

If either Party is rendered wholly or partially unable to perform its obligations under this Contract because of a Force Majeure Event, that party will be excused from whatever performance is affected by the Force Majeure event to the extent so affected provided that:

a) The affected Party gives the other Party Written Notice of the occurrence of the Force Majeure Event as soon as practicable after the occurrence of the Force Majeure Event and also gives the other Party Written Notice describing in reasonable detail the particulars of such occurrence, including an estimation of its expected duration and probable impact on the performance of such Party's obligations hereunder, and thereafter continues to furnish thereto timely regular reports with respect to continuation of the Force Majeure Event;

b) The suspension of performance shall be of no greater scope and of no longer duration than is reasonably required by the Force Majeure.

c) No liability of either Party which arose before the occurrence of the Force Majeure Event causing the suspension of performance shall be excused as a result of the occurrence.

d) The affected Party shall exercise all reasonable efforts to mitigate or limit Damages to the other Party.

e) The affected Party shall use its best efforts to continue to perform its obligations hereunder and to correct or cure the event or condition excusing performance;

f) When the affected Party is able to resume performance of its obligations under this Contract, that Party shall give the other Party Written Notice to that effect and shall promptly resume performance hereunder.

17.3 **Limitations**

Anything in this Contract to the contrary notwithstanding.

a) Any act, event, or occurrence listed above or asserted as a Force Majeure Event that results materially from the negligence or intentional acts of the affected party (including in the case of Contractor or any Sub-contractor thereof) shall not constitute a Force Majeure Event; and

b) The affected Party shall not be relieved from obligations under this Contract to the extent that the negligence or wilful misconduct of the affected Party (or in the case of Contractor or any Sub-contractor thereof) contributes to or aggravates the Force Majeure Event.

17.4 **Effect of Force Majeure Event**

Neither the Owner/Project Manager nor the Contractor shall be considered in default or in Contractual breach to the extent that performance of obligations is prevented by a Force Majeure Event, which arises after the Effective Date. Except as otherwise provided in a Change Order, an extension of time shall be granted to Contractor only to the extent Contractor proves to Owner/Project Manager;

a) The performance of the Work or supply of Goods is actually and necessarily delayed by an event of Force Majeure and

b) The effect of such event of Force Majeure could not have been prevented or avoided or removed despite exercise of reasonable due diligence whether before, after or during the event of Force Majeure.

17.5 **Payment to Contractor**

If, in consequence of Force Majeure, the Plant or any part thereof shall suffer loss or damage, the Contractor shall be entitled to claim and receive payment for the cost of Work or supply of Goods executed in accordance with the Contract, prior to the event of Force Majeure.

17.6 **Optional Termination, Payment and Release**

Irrespective of any extension of time, if a Force Majeure event occurs and its effect continues for a prolonged period, the Partiers may mutually agree to terminate the Contract. If the Contract is terminated under this clause no. 17.6 or under clause no. 13.1, the Owner/Project Manager shall determine the work done and pay to the Contractor.

a) The amounts payable for any Work or supply of Goods carried out for which a Price is stated in the Contract;

b) The cost of Relevant Package and Materials ordered for the Works which have been delivered to the Contractor, or of which the Contractor is liable to accept delivery: such Plant and Materials shall become the property of (and be at the risk of) the Owner/Project Manager against payment therefore by the Owner/Project Manager, and the Contractor shall place the same at the Owner/Project Manager's disposal promptly upon receipt of request in respect thereof from the Owner/Project Manager.

18.0 CLAIMS, DISPUTES, MUTUAL SETTLEMENT & ARBITRATION

18.1 **Procedure for Claims**

18.1.1 If the Contractor or Owner/Project Manager intends to claim any additional payment under any clause of these conditions, the Party claiming shall give Notice to the other Party or as soon as possible and in any event within 30 (thirty) Days of the start of the event giving rise to the claim.

18.1.2 Within 30 (thirty) Days of such Notice, or such other time as may be agreed, the Party claiming shall send to the other Party an account, giving detailed particulars of the amount and basis of the claim along with the necessary supporting documentation. Where the event

giving rise to the claim has a continuing effect, such account shall be considered as interim. The Party claiming shall then, at such intervals as the other Party may reasonably require, send further interim accounts giving the accumulated amount of the claim and any further particulars. Where interim accounts are sent to the other Party, the Party claiming shall send a final account within 15 Days of the end of the effects resulting from the event.

18.1.3 If the Party claiming fails to comply with this clause no. 18.1.2, he shall not be entitled to any additional claim and shall be deemed to have waived the same.

18.2 **Mutual Settlement**

18.2.1 Any disputes or differences arising out of or in connection with the Contract shall, to the extent possible, be settled amicably between the Parties.

18.2.2 If any dispute or difference of any kind whatsoever shall arise between Owner/Project Manager and Contractor, arising out of the Contract for the performance of the Works whether during the progress of Works or after its completion or whether before or after termination, abandonment or breach of Contract, it shall, in the first place be referred to and settled by Owner's Representative, who within a period of 30 (thirty) Days on request by either Party to do so, shall give written notice of his decision to the Owner/Project Manager and the Contractor.

Save as hereinafter provided, such decision in respect of every matter so referred shall be final and binding upon the Parties until the completion of the entire Works and shall forthwith be given effect to by the Owner/Project Manager and/or the Contractor, as applicable, who shall comply with all such decisions with all due diligence.

If the Owner's Representative has given written notice of his decision to the Parties and no claim to arbitration has been communicated to him by either Party within 30 (thirty) Days from receipt of such notice, the said decision shall become final and binding on the Parties.

In the event of the Owner's Representative failing to notify his decision as foresaid within 30 (thirty) Days after being requested as aforesaid, or in the event of either the Owner/Project Manager or the Contractor being dissatisfied with any such decision, as the case may be, within 30 (thirty) Days after the expiry of first mentioned period of 30 (thirty) Days, as the case may be, either Party may require that the matter in dispute be referred to arbitration as hereinafter provided.

18.2.3 All disputes or differences in respect of which the decision, if any, of the Owner's Representative has not become final or binding as aforesaid, shall be referred within the next 30 (thirty) Days, for resolution by the intervention of the Senior Management of the respective Parties within the next 30 (thirty) Days through mutual agreement.

18.3 **Arbitration**

18.3.1 If the disputes or differences under Clause 18.2.3 herein above are still not resolved, the same shall be referred for arbitration in accordance with the Indian Arbitration & Conciliation Act, 1996, or any statutory modification or enactment thereof for the time being in force on the date of the reference to arbitration.

18.3.2 The Contractor and the Owner/Project Manager will continue to perform their respective obligations under the Contract during the Arbitration proceedings unless such performance itself relates to the dispute referred to Arbitration pursuant to this sub-clause.

18.3.3 The Arbitrator Panel shall consist of 3 (three) arbitrators, one to be appointed by the Owner/Project Manager and Contractor respectively and a third one to be appointed by the two arbitrators so appointed by the Owner/Project Manager and the Contractor and the third arbitrator shall be appointed in accordance with the provisions of the Indian Arbitration and Conciliation Act, 1996. It is to be noted that when one party appoints an Arbitrator, the other party should appoint their Arbitrator within 30 (thirty) Days. The

arbitration shall be held in Mumbai and the courts in Mumbai shall have jurisdiction on any matter connected with any Arbitration under this clause no.22.3.

18.3.4 Arbitration shall be sole and exclusive remedy between the Parties regarding the dispute referred to Arbitration and any claims, counterclaims issues or accountings presented or plead to the arbitrators in connection with such dispute.

18.3.5 The award rendered in any Arbitration commenced hereunder shall be final and conclusive. The award should be implemented and promptly paid.

18.3.6 The Arbitrators shall have full powers to review or revise the decisions, opinions, certifications or valuations of the Owner's Representative. The Owner/Project Manager and the Contractor hereby undertake to carry out the award without delay. The expenses of Arbitration shall be paid as may be determined by the arbitrators. They may from time to time, with the consent of the Parties, enlarge the time for making the award. In case of aforesaid arbitrators dying, neglecting, resigning or being unable to act for any reason, it will be lawful for the Parties to nominate another arbitrator with mutual consent of both the parties.

18.3.7 No decision of the Owner's Representative in accordance with foregoing provisions shall disqualify him as being called as a witness or giving evidence before the arbitrators on any matter whatsoever relevant to the dispute or difference referred to arbitrators as foresaid.

18.3.8 This clause 18.3 shall remain in full force and effect notwithstanding any lawful termination of the Contract where either Arbitration has already commenced or the liabilities between the Owner/Project Manager and the Contractor have not been fully determined.

19.0 ENFORCEMENT OF TERMS

19.1 The failure of either Party to enforce at any time any of the provisions of this Contract or any rights in respect thereto or to exercise any option therein 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.

19.2 The exercise by either Party of any of its rights herein shall not preclude or prejudice either Party from exercising the same or any right it may have hereunder.

20.0 REPRESENTATIONS & WARRANTIES

Each Party hereby represents and warrants to the other Party that:

20.1 **Organization, Power and Authority.**

It is duly organized and validly existing under the laws of its jurisdiction of incorporation and is qualified to do business in India/ any other country as specified in SCC, and in all other jurisdictions in which the nature of the business conducted by it makes such qualification necessary, and has all requisite legal power and authority to carry on its business and to execute this Contract and to perform the terms, conditions and provisions hereof.

20.2 **Authorization.**

The execution, delivery and performance by such Party of this Contract have been duly authorized by all requisite corporate action.

20.3 **Enforceability.**

This Contract constitutes the legal, valid and binding obligation of such Party, enforceable in accordance with the terms hereof.

20.4 **No Conflict.**

Neither the execution nor delivery nor performance by such Party of this Contract, nor the consummation of the transactions contemplated hereby, will result in a violation of, or a conflict with, any provision of the organizational documents of such Party; a contravention or breach of, or a default under, any term or provision of any indenture, contract, agreement or instrument to which such Party is a party or by which such Party or its property may be bound, or a violation by such Party of any Law.

20.5 **No Violation of Law.**

It is not in violation of any Law, which violations, individually or in the aggregate, could reasonably be expected to have an adverse effect on it or its performance of any obligations hereunder.

20.6 **Litigation.**

There is no action, suit or proceeding now pending or (to its best knowledge) threatened against it (or any Sub-contractor, in the case of the Contractor) before any court or administrative body or arbitral tribunal that could reasonably be expected to adversely affect the ability of such Party (or any Sub-contractor, in the case of the Contractor) to perform its obligations hereunder (or under any Sub-contract) other than those notified to the Project Company in writing by the Contractor.

20.7 **Contractor's Representations and Warranties.**

The Contractor represents and warrants that:

20.7.1 It has or will be the holder of all Permits required to allow it to operate or conduct its business as contemplated hereby;

20.7.2 It has thoroughly examined this Contract, the Technical Specifications and all applicable Laws and has become familiar with their terms;

20.7.3 It has, and its Sub-contractors have, full experience and proper qualifications to manufacture Equipment and perform the Work and to construct the Relevant Package under the Contract.

20.7.4 It has ascertained the nature and location of all Work to be performed at the Site, the character and accessibility of the Site and its surrounding areas, availability of lay-down areas for Equipment and tools, the existence of obstacles to construction (including any reasonably identifiable underground obstacles, if any, referred to in this Contract), the availability of facilities and utilities, the location and character of existing or adjacent work or structures, the conditions of roads, waterways and railroads in the vicinity of the Site and in the relevant State in India, including the conditions affecting shipping and transportation (such as the limitations of bridges and tunnels), access, disposal, handling and storage of materials, the surface conditions and other general and local conditions, including labour, safety, weather, environmental conditions, geological conditions, if any, noted in this Contract, water supply, water quality, waste water capacity of existing municipal systems and all other matters that might affect its performance of the Work or its costs or the construction of the Relevant Package

20.7.5 All services provided and procedures followed by the Contractor hereunder to engineer, design, procure, construct, commission, start-up and test all the Equipment and other items in the Relevant Package shall be done in a workman-like manner and in accordance with:

a) Prudent Utility Practices, Engineering Standards and the Design Specifications;

b) All applicable requirements of all applicable Laws;

c) All requirements of this Contract; and

d) All instructions of Vendors and manufacturers of Equipment, including instructions relating to storage, erection and testing;

e) Requirements of the latest Gazette of India - CEA Notification Sr. No.211 dated 20th August 2010: – "Technical standards for construction of electrical plants and electric lines;

f) International safety standards & codes for engineering / design;

g) Relevant sustainability standards & codes.

20.7.6 It is familiar with all necessary facilities for delivering, handling and storing all Equipment and other parts of the Work

20.7.7 It is familiar with all labour conditions and agreements relating to the performance of the Work;

20.7.8 It will design the Equipment and Work for Relevant Package so that the useful life thereof may reasonably be expected to 30 (thirty) years;

20.7.9 The Contractor has no reason to believe that any Contractor Permits will not be readily obtainable by the Contractor in the ordinary course of business upon due application thereof;

20.7.10 It has satisfied itself as to the means of communication with and access to and through the Site and accommodations it may require and the precautions and times and methods of working necessary to prevent any Contractor Person from creating any nuisance or interference, whether public or private, which might give rise to any law-and-order problems within or outside the Site.

21.0 SUPPLIER CODE OF CONDUCT:

21.1 Tata Power follows the Tata Code of Conduct (TCoC), Whistle blower Policy and Anti-Bribery & Anti-Corruption Policy and expect all its Contractors / Suppliers including all their employees, agents and other representatives to adhere to the same principles. These policies are available on the following URLs:

Tata Code of Conduct (TCoC): https://www.tatapower.com/pdf/aboutus/Tata-Code-of-Conduct.pdf

Whistle Blower Policy: https://www.tatapower.com/pdf/aboutus/whistle-blower-policy-and-vigil-mechanism.pdf

Anti-Bribery & Anti-Corruption Policy: https://www.tatapower.com/pdf/aboutus/abac-policy.pdf

The Contractors / Suppliers are expected to adhere to the following Do's and Don'ts:

Do's

The Contractor / Supplier shall:

1. be committed to supplying products and services of high quality that meet all applicable standards and laws, including product packaging, labelling and after-sales service obligations.
2. comply with all applicable laws and regulations, both in letter and in spirit, in all the territories in which it operates.
3. strive to provide a safe, healthy and clean working environment for its employees.
4. strive for environmental sustainability, particularly with regard to the emission of greenhouse gases, consumption of water and energy and the management of waste and hazardous materials.
5. shall represent the Company (including Tata brand) only with duly authorised written permission from our company.
6. safeguard the confidentiality on the use of intellectual property, information and data of the Company.
7. ensure gifts and hospitality given or received should be modest in value and appropriate as per Company Policy.
8. ensure the assets of Tata Power shall be employed primarily and judiciously for the purpose of conducting the business for which they are duly authorised.
9. ensure all actual or potential conflicts due to financial or any other relationship with a Tata Power employee shall be disclosed.

Don'ts

1. The Contractor / Supplier shall not make unfair or misleading statements about the products and services of competitors.
2. Children shall not be employed at workplaces.
3. Forced labour shall not be used in any form.
4. The Contractor / Supplier shall neither receive nor offer or make, directly or indirectly, any illegal payments, remunerations, gifts, donations or comparable benefits that are intended, or perceived, to obtain uncompetitive favours for the conduct of its business with Tata Power.

Reporting Violations

The Contractor/Supplier shall notify the Owner/Company regarding any known or suspected improper behaviour of other suppliers or employees relating to its dealings with Tata Power, by email to: cecounsellor@tatapower.com.

The same can also be raised through our 3rd party ethics helpline facility:

Toll-free Number	1800 267 4065
Email	tatapower@tip-offs.in
Website & Chatbot	www.tatapower.tip-offs.in
Postal address	Attn to: Mr. Puneet Arora, Deloitte Touch Tohmatsu India LLP, 6 floor, AIPL Business, Sector 62, Gurugram, Haryana 122102

21.2 If the Contractor/Supplier, or any of its Sub-contractors, agents or servants gives or offers to give or promises to give to any Person any bribe, gift, gratuity or commission as an inducement or reward:

a) For doing or forbearing to do any action in relation to the Contract, or

b) For showing favour or disfavour to any Person in relation to the Contract

or found violating any of the principles of the Supplier Code of Conduct as enumerated above, then the Owner/Project Manager may, after having given 15 (fifteen) Days' Notice to the Contractor, terminate the Contractor's employment under this Contract and also expel him from the Site. The effects of termination contained in clause 13.2 shall apply mutatis mutandis to the termination under this clause including recovery of any loss or damage to the Owner/Project Manager resulting from any such action of giving / offering bribe from final settlement. In addition, it will also be subjected to any criminal liability under Applicable Law.

22.0 MISCELLANEOUS

22.1 **Non-Waiver**

Neither Party shall be deemed to have waived any right under this Contract unless such Party shall have delivered to the other Party a written waiver signed by such waiving Party. No failure or successive failure by either Party to enforce any covenant or agreement, and no waiver or successive waivers by either party of any condition of this Contract, shall operate as a discharge of such covenant, agreement or condition, or render the same invalid, or impair such Party's right to enforce the same in the event of any subsequent breach thereof by the other Party.

22.2 **Severability**

If any of the terms, covenants or conditions hereof or the application of any such term, covenant or condition shall be held invalid or unenforceable as to either Party or as to any circumstance by any court or arbitrator having jurisdiction, the remainder of such terms, covenants or conditions shall not be affected thereby, shall remain in full force and effect and shall continue to be valid and enforceable in any other jurisdiction. In such event, the Parties shall negotiate in good faith to substitute a term, covenant or condition in this Contract to replace the one held invalid or unenforceable by a mutually agreed amendment to this Contract with a view toward achieving a valid and enforceable legal and economic effect as similar as is then reasonably possible to that originally provided for in this Contract.

22.3 **Survival of Provisions**

In order that the Parties may fully exercise their rights and perform their obligations hereunder arising from the performance of the Work, such provisions of this Contract that are required to ensure such exercise or performance shall survive the termination of this Contract for any cause whatsoever.

22.4 **Entire Agreement**

This Contract constitutes the entire agreement and contains all of the understandings and agreements of whatsoever kind and nature existing between the Parties, and supersedes, to the extent permitted by Indian law, all prior written or oral agreements, commitments, representations, communications and understandings between the Parties.

22.5 **Amendment**

No amendment, waiver or consent relating to this Contract shall be effective unless it is in writing and signed by the Parties.

22.6 **Successors and Assigns**

All of the terms and provisions of this Contract shall be binding upon and inure to the benefit of the Parties and their respective successors and permitted assigns. This Contract is for the sole benefit of the Parties, and to the extent provided herein, the Indemnitees, and is not for the benefit of any other Person.

22.7 **Counterparts**

This Contract may be executed in one or more counterparts, each of which shall be deemed to be an original and all such counterparts shall together constitute one and the same contract.

22.8 **No Benefit to Third Parties**

For the avoidance of doubt, this Contract is not intended to confer any legally enforceable rights on any Person other than the Parties, their successors in title and their permitted assignees, whether pursuant to the Contracts (Right of Third Parties) Act 1999 or otherwise.

25.9 **Certification**

The Contractor should be SA (8000 or equivalent), ISO 14001 and OHSAS-18001 certified. In the event Contractor does not have the certification, then the Contractor shall immediately apply for and obtain these accreditations before the commencement of Site Works. Owner shall not permit any work at Site unless Contractor presents bonafide evidence towards obtaining these certifications. Time/cost extension shall not be allowed for any delay in Project Schedule due to Contractor's failure in timely obtaining of these accreditations. Contractor must also certify that the handling, use and disposal of the product shall be consistent with sound environment management.

23.0 Sustainability

The Contractor shall abide to the Owner / Project Manager's Corporate Environment Policy, Responsible Supply Chain Management Policy Supplier Code of Conduct and Corporate ESG Framework (enclosed with the tender document).

The Contractor should strive towards Conservation of Energy, Water, Resources and optimize transportation of Men & Materials to minimize environmental impact and reduce carbon footprint.

The Contractor should carry out the assessment of materials used for construction, operation & maintenance, consumables and accordingly phase out those materials which are environmentally hazardous.

The Contractor organization should be SA 8000, ISO 14001 and SA 8000 and OHSAS-18001 certified. If not, the Contractor shall certify that the handling, use and disposal of your product consider practices consistent with sound environment management.

The Contractor shall commit to the human rights principle of no child labour, no forced labour, non-discrimination on the basis of caste, colour, religion, gender, disability and any other factor unrelated to the requirements of the job.

The Contractor shall commit to equal pay for equal value of work, especially for women.

The Contractor shall also carry out assessment of their Sub-contractors on their sustainability readiness so that they comply with the above-mentioned standards.

24.0 Total Compliance to TCOC, SHE and Contractor Safety Terms & Conditions

The Contractor shall abide by and comply in totality with the latest versions of Owner / Project Manager's Safety, Health & Environment policies, Contractor Safety Terms & Conditions, Sustainability and TCOC manuals / documents as enclosed with the tender or as amended by Owner from time to time.

25.0 Novation

Owner shall have the right to novate the Contract at its sole discretion to any Tata Group Companies including associates and subsidiaries thereof if the situation so warrants. The Contractor shall have no objection and will fully extend co-operation for such Novation of the Contract to any Tata Group Companies including associates and subsidiaries thereof.

26.0 Changes In Constitution

Where the Contractor is a partnership firm, a prior approval in Writing of the Owner / Project Manager shall be obtained before any change is made in the constitution of the firm and where the Contractor is an incorporated entity, a prior approval in Writing of the Owner / Project Manager should be obtained before any change in Control of the Contractor. Where the Contractor is an individual or a Hindu undivided family business concern, such approval as aforesaid shall likewise be obtained before the Contractor enters into any partnership agreement where-under the partnership firm would have the right to carry out the work hereby undertaken by the Contractor.

27.0 Prohibition on Publicity

The Contractor shall not advertise or promote itself using the name, description of the Owner / Project Manager without the prior written consent if the Owner / Project Manager in the case of each use.

The Contractor shall not issue or make any public announcement or disclose any information regarding this Contract unless prior to such public announcement or disclosure it furnishes to the Owner / Project Manager with a copy of such announcement or information and obtains written approval to its terms. However, no Party shall be prohibited from issuing or making any such public announcement or disclosing such information if it is necessary to do so to comply with any applicable Law or the regulations of a recognized stock exchange.

28.0 Declaration by Contractor

All articles, Clauses, Conditions, Manuals, instructions cross referred in this GCC are fully read, understood by the Contractor in their entirety for fruitful implementation.