

निविदा / Enquiry



भारत हेवी इलेक्ट्रिकल्स लिमिटेड
Bharat Heavy Electricals Limited
पारेषण व्यापार समूह / Transmission Business Group
सामग्री प्रबंधन / Materials Management

Project : UPPTCL RASARA (BALLIA)

Enquiry No	Enquiry Dt	Rev No	Rev Dt	PI No	Enquiry Type	Inspection by	Due Dt	Commercial Comments	Technical Comments	Signing Authority
70Q2000356	10-Dec-19	0		70I2000455	Package		24-Dec-19	BHEL NIT TERMS AND CONDITIONS ARE APPLICABLE	TECHNICAL SPECIFICATION IS APPLICABLE	RAJEEV KUMAR ROY

Document Enclosed

SN	Equipment	HSN Code	Phy Unit	Qty	Plan Dt	Comments
1	SUPPLY- VISUAL MONITORING SYSTEM/CCTV : 32 INCH FULL HD 1080P LED SMART TV. WITH WALL MOUNTING BRACKET.	0	NO	2.0000		SONY MAKE (MODEL NO. 32R402)
2	SUPPLY- VISUAL MONITORING SYSTEM/CCTV : 6 CORE ARMOURED FIBRE OPTIC CA	0	MTR	2500.0000		
3	SUPPLY- VISUAL MONITORING SYSTEM/CCTV : BULLET CAMERA	0	NO	12.0000		STATIC (BULLET) CAMERAS OF BOSCH MAKE/ SONY MAKE / ANY EQUIVALENT MAKE AS PER DETAILED TECHNICAL SPECIFICATION
4	SUPPLY- VISUAL MONITORING SYSTEM/CCTV : CAT 6 UTP CABLE (UTP) INCLUDING TERMINAL CONNECTORS	0	MTR	1000.0000		OR CONNECTING PTZ CAMERAS TO DVR AS PER SPECIFICATION. (ONLY D-LINK MAKE)
5	SUPPLY- VISUAL MONITORING SYSTEM/CCTV : POWER CABLE	0	MTR	2000.0000		3 CORE 1.5 SQ. MM. COPPER POWER CABLE OF FINOLEX / STANDARD MAKE AS PER IS

SN	Equipment	HSN Code	Phy Unit	Qty	Plan Dt	Comments
6	SUPPLY- VISUAL MONITORING SYSTEM/CCTV : PTZ CAMERA-OUTDOOR	0	NO	3.0000		BOSCH MAKE / SONY MAKE / ANY EQUIVALENT MAKE (36X EXTENDED ZOOM), 12X DIGITAL ZOOM AS PER DETAILED TECHNICAL SPECIFICATION
7	SUPPLY- VISUAL MONITORING SYSTEM/CCTV : 40MM HDPE PIPE	0	MTR	3000.0000		
8	SUPPLY- VISUAL MONITORING SYSTEM/CCTV : 2 KVA ONLINE UPS WITH ISOLATION TRANSFORMER SUITABLE FOR SINGLE PHASE AC INPUT & SINGLE PHASE AC OUTPUT, FLOOR MOUNTED TYPE WITH 60 MIN BACKUP	0	SET	1.0000		
9	SUPPLY- VISUAL MONITORING SYSTEM/CCTV : EARTHING OF CAMERA / DVR	0	SET	16.0000		
10	SUPPLY- VISUAL MONITORING SYSTEM/CCTV : COMPUTER TABLE	0	SET	1.0000		COMPUTER TABLE AS PER THE SPECIFICATION OF GODREJ / METHODEX / STANDARD MAKE.
11	SUPPLY- VISUAL MONITORING SYSTEM/CCTV : POWER SUPPLY	0	SET	15.0000		FOR CAMERAS AT SR NO 1 AND 2
12	SUPPLY- VISUAL MONITORING SYSTEM/CCTV : DIGITAL VIDEO RECORDER	0	SET	1.0000		16 CHANNEL DVR OF BOSCH MAKE / SONY MAKE / ANY EQUIVALENT MAKE AS PER DETAILED TECHNICAL SPECIFICATION

You are requested to submit your most competitive offer so as to reach us positively by the tender opening date & time. THE TENDERS NOT RECEIVED WITHIN SCHEDULED DATE AND TIME ARE LIKELY TO BE IGNORED. BHEL shall not be responsible for any postal delay.

In your own interest, you are advised to carefully read "the instructions to bidders". Incomplete bids and/or bids not complying with tender conditions shall be treated as non-responsive and are likely to be ignored.

In case Tender Documents are not received within 7 days of this E-mail message, intimate BHEL accordingly. If no intimation is received, it will be considered that you have received tender enquiry and delay in submission offer due to late receipt of tender documents will not be entertained.

You are requested to submit your most competitive offer as stated in Terms & conditions.

BHEL reserves the right to opt for reverse auction for obtaining best prices.

Offers Through E-MAIL / FAX / E-Procurement Portal:

WHOSOEVER DESIRES TO SEND OFFERS ON THEIR OWN RISK (COMPLETE IN ALL RESPECTS) VIA E-MAIL or FAX HAVE TO SEND THE OFFERS TO THE COMMON E-MAIL ADDRESS tenderbox@bhel.in or 0120-6748581 FAX or bhel.abc.procure.com as instructed.

THE RECEIVED EMAIL OFFERS WILL BE PRINTED BY PURCHASE COORDINATOR AND PUT THEM INTO COVERS AS PER CONVENTIONAL METHOD FOR TENDER OPENING I.E., TECHNO COMMERCIAL & PRICE OFFER SHALL BE PUT INTO TWO SEPARATE COVERS AND BOTH THE COVERS ARE KEPT IN THIRD COVER DULY SUPER SCRIBING ENQY. NO. AND DUE DATE.

OFFERS SENT TO ANY OTHER E-MAIL ID or FAX NO AND INCOMPLETE OFFERS SHALL NOT BE CONSIDERED FOR EVALUATION PURPOSE.

It is suggested that the bidders are advised to send the files with 'password protection'.

The venders who has sent offers with password, the passwords are to be forwarded to another email id: tenderbox@bhel.in

Please acknowledge the receipt of tender enquiry and fax back this letter by ticking the appropriate item below.

भारत हेवी इलेक्ट्रिकल्स लिमिटेड के लिए / for BHARAT HEAVY ELECTRICALS LTD

We acknowledge the receipt of tender.

- (a) The offer against subject enquiry shall be submitted by the scheduled date and time.
- (b) We regret to quote. The item in reference is out of our manufacturing range.
- (c) We regret because of our prior commitments.
- (d) Any other reason.

To
A K Chowdhary
Sr Dy General Manager
BHARAT HEAVY ELECTRICALS LIMITED
TRANSMISSION BUSINESS GROUP
TOWER-A, 5th Floor,
Advant Navis IT Business Park,
Plot No-7, Sector-142, Expressway Noida
Noida-201305
Distt. Gautam BudhNagar, U.P

Ph: 0120-6748471
Fax: 0120-6748581

Enquiry No : 70Q2000356 Enquiry Dt : 10-Dec-19

21/12/19
राजीव कुमार रॉय / Rajeev Kumar Roy
प्रबंधक (टी.बी.एम.एन.) / Manager (T.B.M.M.)
परिचालन व्यापार समूह / Transmission Business Group
भारत हेवी इलेक्ट्रिकल्स लिमिटेड
Bharat Heavy Electricals Limited
5th Floor, Tower-A, Advant Navis IT Business Park,
Plot No.-7, Sector-142, Expressway Noida-201305 (U.P.)

हस्ताक्षर और निविदाकार की सील / Signature and Seal of Tenderer

निविदा / Enquiry



भारत हेवी इलेक्ट्रिकल्स लिमिटेड
Bharat Heavy Electricals Limited
पारेषण व्यापार समूह / Transmission Business Group
सामग्री प्रबंधन / Materials Management

Project : UPPTCL SHAMLI GIS

Enquiry No	Enquiry Dt	Rev No	Rev Dt	PI No	Enquiry Type	Inspection by	Due Dt	Commercial Comments	Technical Comments	Signing Authority
70Q2000357	10-Dec-19	0		70I2000456	Package		24-Dec-19	BHEL NIT TERMS AND CONDITIONS ARE APPLICABLE	TECHNICAL SPECIFICATION IS APPLICABLE	RAJEEV KUMAR ROY

Document Enclosed

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भारत हेवी इलेक्ट्रिकल्स लिमिटेड के लिए / for BHARAT HEAVY ELECTRICALS LTD

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To
A K Chowdhary
Sr Dy General Manager
BHARAT HEAVY ELECTRICALS LIMITED
TRANSMISSION BUSINESS GROUP
TOWER-A, 5th Floor,
Advant Navis IT Business Park,
Plot No-7, Sector-142, Expressway Noida
Noida-201305
Distt. Gautam BudhNagar, U.P

Ph: 0120-6748471
Fax: 0120-6748581

Enquiry No : 70Q2000357 Enquiry Dt : 10-Dec-19

21/12/19
राजीव कुमार रॉय / Rajeev Kumar Roy
प्रबंधक (टी.बी.एम.एन.) / Manager (T.B.M.M.)
पारिवर्तन व्यापार समूह / Transmission Business Group
भारत हेवी इलेक्ट्रिकल्स लिमिटेड
Bharat Heavy Electricals Limited
5th Floor, Tower-A, Advant Navis IT Business Park,
Plot No.-7, Sector-142, Expressway Noida-201305 (U.P.)

हस्ताक्षर और निविदाकार की सील / Signature and Seal of Tenderer

SPECIAL TERMS & CONDITIONS
FOR CCTV CAMERA FOR UPPTCL SHAMLI & BALLIA PROJECT

Enquiry No:, Dated.....

1. In case any discrepancy between the requirements mentioned under special terms & conditions and general terms & conditions, special terms and conditions shall prevail.
2. For any technical clarification, kindly contact **Mr. SOUMIK BANERJEE, DY MGR (TBEM) / Mr. VIVEK KAPIL, SR. DGM-TBEM**
BHEL, Transmission Business Group
Tower-A, 5th Floor, Advant Navis IT Business Park
Plot-7, Sector-142, Expressway Noida, Noida-201305, UP, India
Phone: +91 (0) 0120- 6748506/8539
Fax: +91 (0) 0120 – 6748580.
E-mail: soumik@bhel.in / vivek@bhel.in
3. For any commercial clarification, kindly contact **Rajeev Kumar Roy, Manager (TBMM);**
BHEL, Transmission Business Group
Tower-A, 5th Floor, Advant Navis IT Business Park
Plot-7, Sector-142, Expressway Noida, Noida-201305, UP, India
Phone: +91 (0) 0120- 6748484
Fax: +91 (0) 0120 – 6748580.
Contact No. 0120 6748484; e-mail: rajeevroy@bhel.in.
4. **Bidder to submit offer directly through E-PROCUREMENT MODE ONLY.** Bidder may visit <https://bhel.abcprocure.com>. No other mode for submission of tender is acceptable. Note: Both bids (Techno-commercial Bid & Price Bid) will be opened immediate after receipt of offer.
5. **Proposed delivery plan: IMMEDIATE.** However, vendor has to examine their best possible delivery plan & mentioned in **ACTIVITY SCHEDULE** to meet the tender delivery requirement. In case, BHEL's delivery requirement is not met by vendor(s), then a chance may be given to all such vendors to review their quoted delivery schedule in line with BHEL's delivery requirement. However, if vendor fails to meet the requisite delivery plan, then BHEL reserves the right not to consider the offer of such vendor(s).
6. **Technical specification No:** BHEL technical specification no: TB-404-316-029, REV-00 is applicable. No permissible Technical Deviation has been envisaged.
7. **Quantity Variation:** The final quantity may vary at contract stage by +/- 30%,
8. **PQR (Pre-qualification requirement):** Bidder must comply with technical specification of tender enquiry otherwise offer is liable for rejection.

SPECIAL TERMS & CONDITIONS

FOR CCTV CAMERA FOR UPPTCL SHAMLI & BALLIA PROJECT

Enquiry No:, Dated.....

9. **Clause No. 2.1 of General Terms & Conditions (GTC) for tender Enquiry / Contract should be as follows:**

PRICES: A. all prices shall be FIRM & Ex-works price including packing & forwarding charges. No enhancement of rate for whatsoever reasons unless and until asked by BHEL shall be allowed.

PROJECT STATUS: Domestic in nature. GST is applicable as per prevalent law.

10. **PERFORMANCE BG (Refer Clause no-7 of General Terms and condition): Option-B is applicable** in case not opt any option as per NIT condition and cover guarantee period for project wise as validity of BG.

11. **DEFECT LIABILITY (GUARANTEE SPECIFIC CLAUSE):**

UPPTCL SHAMLI PROJECT: The guarantee period of equipment shall be twelve (12) months from the date of Taking Over plant. Taking Over plant is 16-01-2021.

UPPTCL BALLIA PROJECT: The guarantee period of equipment shall be twelve (12) months from the date of Taking Over plant. Taking Over plant is 02-07-2020.

12. **LIQUIDATED DAMAGES FOR DELAYED DELIVERY (Clause No:13 of GTC for tender Enquiry / Contract should be as follows:**

In case of delay in execution of Purchase Order beyond the contractual delivery time, an amount of 0.5% of the total PO ex-works value for supply (excluding taxes and duties, freight & insurance as applicable) per week of delay or part thereof subject to a maximum of 10% of the total Purchase Order ex-works value for supply (excluding taxes and duties, freight & insurance as applicable) shall be deducted as Liquidated Damages (LD) along with applicable GST (if any) on LD

13. **Clause No. 33 for Reverse Auction of NIT shall be as follows:**

"BHEL reserves the right to go for Reverse Auction (RA) (Guidelines as available on www.bhel.com) instead of opening the sealed envelope price bid, submitted by the bidder. This will be decided after techno-commercial evaluation. Bidders 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 BHEL decides to go for RA.

Those bidders who have given their acceptance to participate in Reverse Auction will have to necessarily submit 'Process compliance form' (to the designated service provider) as well as 'Online sealed bid' in the Reverse Auction. Non-submission of 'Process compliance form' or 'Online sealed bid' by the agreed bidder(s) will be considered as tampering of the tender process and will invite action by BHEL as per extant guidelines for suspension of business dealings with suppliers/ contractors (as available on www.bhel.com).

The bidders have to necessarily submit online sealed bid less than or equal to their envelope sealed price bid already submitted to BHEL along with the offer.

SPECIAL TERMS & CONDITIONS

FOR CCTV CAMERA FOR UPPTCL SHAMLI & BALLIA PROJECT

Enquiry No:, Dated.....

The envelope sealed price bid of successful L1 bidder in RA, if conducted, shall also be opened after RA and the order will be placed on lower of the two bids (RA closing price & envelope sealed price) thus obtained. The bidder having submitted this offer specifically agrees to this condition and undertakes to execute the contract on thus awarded rates.

If it is found that L1 bidder has quoted higher in online sealed bid in comparison to envelope sealed bid for any item(s), the bidder will be issued a warning letter to this effect. However, if the same bidder again defaults on this count in any subsequent tender in the unit, it will be considered as fraud and will invite action by BHEL as per extant guidelines for suspension of business dealings with suppliers/ contractors (as available on www.bhel.com)."

As a reminder to the bidders, system will flash following message (in RED Color) during the course of 'online sealed bid': "Bidders to submit online sealed bid less than or equal to their envelope sealed bid already submitted to BHEL.

In addition to above RA guidelines, bidder note that

(A) In case where RA is conducted successfully Reverse auction shall be conducted as per existing procedure of BHEL. Ranking of bids shall be based on final price fed by respective bidder (including H1 bidder) in reverse auction process. If L1 bid is from a 'Local Supplier', L-1 bidder may be considered for further award of work. No other Bidder shall be invited to match price of L-1 Bidder

If L1 bid is not from a 'Local Supplier', the lowest evaluated bidder among the 'Local Suppliers' based on the ranking of the price after RA, will be invited to match the L1 price provided 'Local Supplier's price is within the Margin of Purchase Preference i.e. +20% of L1 price. In case such local supplier agrees to match the price of L-1 Bidder, such local supplier may be considered for further award of work. In case such lowest eligible 'Local Supplier' fails to match the L1 price, the eligible 'Local Supplier' with the next higher bid within the Margin of Purchase Preference (i.e 20% of L-1 Price) as above shall be invited to match the L1 price, and so on, and may be considered for award of work accordingly. In case none of the 'Local Suppliers' within the Margin of Purchase Preference (i.e. 20% of L-1 price) matches the L1 price, then the L1 bidder may be considered for award of work.

(B) In case where RA is failed, Price bid shall be opened as per reverse auction procedure of BHEL and based on the same make in India policy shall be implemented.

14. **PRICE BID FORMAT:** Vendor to quote as per specified price format of NIT, otherwise their offer shall be liable to be rejected.

15. **IMPORTANT INSTRUCTION:**

- Final acceptance of technical qualified vendor for placement of order is subject to approval of CUSTOMER (UPPTCL).

SPECIAL TERMS & CONDITIONS

FOR CCTV CAMERA FOR UPPTCL SHAMLI & BALLIA PROJECT

Enquiry No:, Dated.....

- Bidder who are not approved by customer, needs to submit complete credential (documents viz last three year of balance sheet, UPPTCL/PGCIL/ NTPC approval letter if any, Performance certificates, company profile etc) for approval from CUSTOMER & placement of order is subject to approval of CUSTOMER.
- All boxes / Containers are to be distinctly marked with boldly written "TBG" mark on it.
- PO/LOI shall be placed to L1 bidder project wise. However evaluation shall be done based on overall quantity as per NIT.

16. **Promotion of MAKE IN INDIA:** For this procurement, Public Procurement (Preference to Make in India), Order 2017 dated 15.06.2017 & 28.05.2018 and subsequent orders issued by the respective nodal ministry shall be applicable even if issued after issue of this NIT but before finalization of contract/PO/WO against this NIT.

In the event of any Nodal Ministry prescribing higher or lower percentage of purchase preference and/ or local content in respect of this procurement, same shall be applicable. Preference to Make in India will be as per the Public Procurement (Preference to Make in India), Order 2017 available in the following link:

http://dipp.nic.in/sites/default/files/publicProcurement_MakeinIndia_15June2017.pdf

http://dipp.nic.in/sites/default/files/Revised-PPP-MII-Order-2017_28052018.pdf

For this procurement, Public Procurement (Preference to Make in India) Order, 2017" dated 15/06/2017 & 28/05/2018 and subsequent orders issued by respective nodal ministry shall be applicable even if issued after issue of this NIT but before finalization of contract /PO/WO against this NIT.

In the event of any nodal ministry prescribing higher and lower percentage of purchase preference and/ or local content in respect of this procurement, same shall be applicable.

Note: Bidder to submit FORMAT duly filled & signed and stamped by their authorized persons. It is mandatory against this NIT. Minimum Local content is 50% (being transmission/sub-station package).

17. Following confirmation to be provided by vendor:

"We confirm that we have quoted as per specified price format provided along with this tender".

NAME & SEAL OF TENDERER

Enclosed:

- Commercial deviation sheet, technical deviation sheet.
- Local content certificate
- Activity schedule
- General terms and condition for supply.
- General terms and condition for ETC works
- Un-priced bid format.

Item Name :	CCTV CAMERA
Enquiry No. :	
Project :	UPPTCL SHAMLI & BALLIA PROJECT
Type of project	Transmission / Thermal (Coal or Gas) / Hydro
Applicable percentage of Local Content	50 % (Minimum)

Format for Affidavit of Self certification regarding Minimum Local Content in line with PPP-MII order, 2017 if applicable, to be provided on a non-judicial stamp paper of Rs. 100/-.

Date: / /2019

I _____ S/o, _____ D/o, _____ W/o, _____ Resident of _____ hereby solemnly affirm and declare as under:

That I will agree to abide by the terms and conditions of the Public Procurement (Preference to Make in India) Order, 2017 (*hereinafter PPP-MII order*) of Government of India issued vide Notification No:P-45021/2/2017 -BE-II dated 15/06/2017, its revision dated 28/05/2018 and any subsequent modifications/ Amendments, if any and

That the information furnished hereinafter is correct to the best of my knowledge and belief and I undertake to produce relevant records before the procuring entity/BHEL or any other Government authority for the purpose of assessing the local content of goods/services/works supplied by me for (*Enter the name of the Equipment/Item for Project*).

That the local content for all inputs which constitute the said goods/services/works has been verified by me and I am responsible for the correctness of the claims made therein.

That the goods/services/works supplied by me for (*Enter the name of the Equipment/Item for Project*) meets the 'Minimum Local Content' as defined in the PPP-MII order.

That the value addition for the purpose of meeting the 'Minimum Local Content' has been made by me at (*Enter the details of the location(s) at which value addition is made*).

That in the event of the local content of the goods/services/works mentioned herein is found to be incorrect and not meeting the prescribed Minimum Local Content criteria, based on the assessment of procuring agency (ies)/BHEL/Government Authorities for the purpose of assessing the local content, action shall be taken against me in line with the PPP-MII order and provisions of the Integrity pact/ Bidding Documents.

I agree to maintain the following information in the Company's record for a period of 8 years and shall make this available for verification to any statutory authority.

- i. Name and details of the Local Supplier
(Registered Office, Manufacturing unit location, nature of legal entity)
- ii. Date on which this certificate is issued
- iii. Goods/services/works for which the certificate is produced
- iv. Procuring entity to whom the certificate is furnished
- v. Percentage of local content claimed and whether it meets the Minimum Local Content prescribed
- vi. Name and contact details of the unit of the Local Supplier (s)
- vii. Sale Price of the product
- viii. Ex-Factory Price of the product
- ix. Freight, insurance and handling
- x. Total Bill of Material
- xi. List and total cost value of input used to manufacture the Goods/to provide services/in construction of works
- xii. List and total cost of input which are domestically sourced. Value addition certificates from suppliers, if the input is not in-house to be attached
- xiii. List and cost of inputs which are imported, directly or indirectly

For and on behalf of..... (Name of firm/entity)

Authorized signatory (To be duly authorized by the Board of Directors)
<Insert Name, Designation and Contact No.>

SCHEDULE OF TECHNICAL DEVIATION

This Format is to be submitted in original duly signed by bidder.
The following are the deviations/variations/exceptions from the Terms and Conditions :-

S N	CLAUSE NO. OF TERMS AND CONDITIONS	STATEMENT OF DEVIATION

In case, this schedule is not submitted, it will be presumed that the equipment /material to be supplied under this contract is deemed to be in compliance with the Terms and Conditions.

If there is NIL deviation, even then the format to be filled as NIL DEVIATION.

Note : Continuation Sheets of like size and format may be used as per the Bidder's Requirement and shall be annexed to this schedule.

Place :
Date :

Signature of the authorised representative of

Bidder's name :
Designation:
Company Seal:

SCHEDULE OF COMMERCIAL DEVIATION

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The following are the deviations/variations/exceptions from the Terms and Conditions :-

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Date :

Signature of the authorised representative of

Bidder's name :
Designation :
Company Seal :

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SCHEDULE OF PRICE BID - SUPPLY

(BIDDERS TO STRICTLY ENSURE SUBMITTING THE PRICE BIDS IN THIS FORMAT)

PROJECT: UPPTCL BALLIA & SHAMLI PROJECT

ENQUIRY NO:

ITEM: CCTV CAMERA - SUPPLY WORKS

SN	DESCRIPTION OF ITEM (As per Tech Spec. TB-404-316-029)	UNIT	QTY	HSN CODE	UNIT EX. WORKS (Rs.)	TOTAL EX. WORKS (Rs.)	UNIT FREIGHT & INSURANCE UP TO SITE (Rs.)	TOTAL FREIGHT & INSURANCE UP TO SITE (Rs.)	GST @..... % OF TOTAL EX-WORKS (Rs.)	GST @.....% OF (TOTAL FREIGHT & INSURANCE UP TO SITE)	TOTAL F.D.R. DESTINATION PRICE
PROJECT: UPPTCL BALLIA PROJECT											
1	SUPPLY- VISUAL MONITORING SYSTEM/CCTV : PTZ CAMERA- OUTDOOR	NO	3								
2	SUPPLY- VISUAL MONITORING SYSTEM/CCTV : BULLET CAMERA	NO	12								
3	SUPPLY- VISUAL MONITORING SYSTEM/CCTV : DIGITAL VIDEO RECORDER	SET	1								
4	SUPPLY- VISUAL MONITORING SYSTEM/CCTV : POWER SUPPLY	SET	15								
5	SUPPLY- VISUAL MONITORING SYSTEM/CCTV : 32 INCH FULL HD 1080P LED SMART TV. WITH WALL MOUNTING BRACKET.	NO	2								
6	SUPPLY- VISUAL MONITORING SYSTEM/CCTV : POWER CABLE	MTR	2000								
7	SUPPLY- VISUAL MONITORING SYSTEM/CCTV : COMPUTER TABLE	SET	1								
	SUPPLY- VISUAL MONITORING SYSTEM/CCTV : 2 KVA ONLINE UPS WITH ISOLATION TRANSFORMER SUITABLE FOR SINGLE PHASE AC INPUT & SINGLE PHASE AC OUTPUT, FLOOR MOUNTED TYPE WITH 60 MIN BACKUP	SET	1								
9	SUPPLY- VISUAL MONITORING SYSTEM/CCTV : 8 CORE ARMoured FIBRE OPTIC CA	MTR	2500								
10	SUPPLY- VISUAL MONITORING SYSTEM/CCTV : CAT 6 UTP CABLE (UTP) INCLUDING TERMINAL CONNECTORS	MTR	1000								
11	SUPPLY- VISUAL MONITORING SYSTEM/CCTV : 40MM HDPE PIPE	MTR	3000								
12	SUPPLY- VISUAL MONITORING SYSTEM/CCTV : EARTHING OF CAMERA / DVR	SET	16								
PROJECT: UPPTCL SHAMLI PROJECT											
1	SUPPLY- VISUAL MONITORING SYSTEM/CCTV : PTZ CAMERA-OUTDOOR	NO	3								
2	SUPPLY- VISUAL MONITORING SYSTEM/CCTV : BULLET CAMERA	NO	13								
3	SUPPLY- VISUAL MONITORING SYSTEM/CCTV : DIGITAL VIDEO RECORDER	SET	1								
4	SUPPLY- VISUAL MONITORING SYSTEM/CCTV : POWER SUPPLY	SET	18								
5	SUPPLY- VISUAL MONITORING SYSTEM/CCTV : 32 INCH FULL HD 1080P LED SMART TV. WITH WALL MOUNTING BRACKET.	NO	2								
6	SUPPLY- VISUAL MONITORING SYSTEM/CCTV : POWER CABLE	MTR	2000								
7	SUPPLY- VISUAL MONITORING SYSTEM/CCTV : COMPUTER TABLE	SET	1								
8	SUPPLY- VISUAL MONITORING SYSTEM/CCTV : 2 KVA ONLINE UPS WITH ISOLATION TRANSFORMER SUITABLE FOR SINGLE PHASE AC INPUT & SINGLE PHASE AC OUTPUT, FLOOR MOUNTED TYPE WITH 60 MIN	SET	1								
9	SUPPLY- VISUAL MONITORING SYSTEM/CCTV : 8 CORE ARMoured FIBRE OPTIC CA	MTR	2500								
10	SUPPLY- VISUAL MONITORING SYSTEM/CCTV : CAT 6 UTP CABLE (UTP) INCLUDING TERMINAL CONNECTORS	MTR	1000								
11	SUPPLY- VISUAL MONITORING SYSTEM/CCTV : 40MM HDPE PIPE	MTR	3000								
12	SUPPLY- VISUAL MONITORING SYSTEM/CCTV : EARTHING OF CAMERA / DVR	SET	17								
A	TOTAL DELIVERED COST TO BHEL=										

NOTE:

1. PLEASE NOTE THAT UNPRICED COPY OF PRICE BID (i.e. WITH ALL PRICES BLANKED) SHALL BE FURNISHED ALONG WITH TECHNO-COMMERCIAL BID.
2. REQUIRED COPIES OF FORMAT BE MADE & DETAILS MAY BE ANNEXED.
3. THE PRICES MUST BE QUOTED IN THE PRESCRIBED UNIT ONLY.
4. BHEL STANDARD SPECIFICATION NO:TB-406-316-029 IS APPLICABLE

SIGNATURE & SEAL OF TENDERER

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SCHEDULE OF PRICE BID - ETC WORKS

(BIDDERS TO STRICTLY ENSURE SUBMITTING THE PRICE BIDS IN THIS FORMAT)

PROJECT: UPPTCL BALLIA & SHAMLI PROJECT

ENQUIRY NO:

ITEM: CCTV CAMERA - ETC WORKS

SN	DESCRIPTION OF ITEM (As per Tech Spec. TB-404-316-029)	UNIT	QTY	HSN CODE	UNIT CHARGES (Rs.)	TOTAL CHARGES (Rs.)	GST @..... % OF TOTAL CHARGES (Rs.)	TOTAL F.O.R. DESTINATION PRICE
PROJECT: UPPTCL BALLIA PROJECT								
1	ETC - PTZ Dome Camera of BOSCH make / Sony make / Any equivalent make (36X extended Zoom), 12X Digital Zoom as per detailed technical specification	NO	3					
2	ETC - Static (Bullet) Cameras of BOSCH make/ Sony make / Any equivalent make as per detailed technical specification	NO	12					
3	ETC - 16 channel DVR of BOSCH make / Sony make / Any equivalent make as per detailed technical specification	SET	1					
4	ETC - POWER SUPPLY for item no. 1 & 2	SET	15					
5	ETC - 32" LED TV Sony make (Model No. 32R402) as per detailed technical specification.	NO	2					
6	ETC - 3 core 1.5 Sq. mm. copper power cable of Finolex / Standard make as per IS	MTR	2000					
7	ETC - Computer table as per the specification of Godrej / Methodex / Standard Make.	SET	1					
8	ETC - 2 KVA online UPS with isolation transformer suitable for single phase AC input & single phase AC output, Floor Mounted Type with 60 min backup	SET	1					
9	ETC - FO Cable 6 core	MTR	2500					
10	ETC - CAT-6 cable for connecting PTZ cameras to DVR as per specification. (only D-link make)	MTR	1000					
11	ETC - 40MM HDPE pipe	MTR	3000					
12	ETC - Earthing of camera / DVR as per specification	SET	16					
PROJECT: UPPTCL SHAMLI PROJECT								
1	ETC - PTZ Dome Camera of BOSCH make / Sony make / Any equivalent make (36X extended Zoom), 12X Digital Zoom as per detailed technical specification	NO	3					
2	ETC - Static (Bullet) Cameras of BOSCH make/ Sony make / Any equivalent make as per detailed technical specification	NO	13					
3	ETC - 16 channel DVR of BOSCH make / Sony make / Any equivalent make as per detailed technical specification	SET	1					
4	ETC - POWER SUPPLY for item no. 1 & 2	SET	16					
5	ETC - 32" LED TV Sony make (Model No. 32R402) as per detailed technical specification.	NO	2					
6	ETC - 3 core 1.5 Sq. mm. copper power cable of Finolex / Standard make as per IS	MTR	2000					
7	ETC - Computer table as per the specification of Godrej / Methodex / Standard Make.	SET	1					
8	ETC - 2 KVA online UPS with isolation transformer suitable for single phase AC input & single phase AC output, Floor Mounted Type with 60 min backup	SET	1					
9	ETC - FO Cable 6 core	MTR	2500					
10	ETC - CAT-6 cable for connecting PTZ cameras to DVR as per specification. (only D-link make)	MTR	1000					
11	ETC - 40MM HDPE pipe	MTR	3000					
12	ETC - Earthing of camera / DVR as per specification	SET	17					
A	TOTAL DELIVERED COST TO BHBL=							

NOTE:

- PLEASE NOTE THAT UNPRICED COPY OF PRICE BID (i.e. WITH ALL PRICES BLANKED) SHALL BE FURNISHED ALONG WITH TECHNO-COMMERCIAL BID.
- REQUIRED COPIES OF FORMAT BE MADE & DETAILS MAY BE ANNEXED.
- THE PRICES MUST BE QUOTED IN THE PRESCRIBED UNIT ONLY.
- BHBL STANDARD SPECIFICATION NO:TB-406-316-029 IS APPLICABLE

SIGNATURE & SEAL OF TENDERER

ACTIVITY SCHEDULE FOR CCTV CAMERA

ENQUIRY NO:....., Dated.....

SN	ACTIVITY	TIME ALLOTTED [in weeks]	CUMULATIVE TIME FROM RECEIPT OF INPUTS FROM BHEL [in weeks]	SCOPE
1.	Submission of Documents necessary for getting manufacturing clearance like drawings, Data sheet.	2	2	BY SUPPLIER
2.	Review and Approval of documents from BHEL/Customer and issue of manufacturing clearance.	4	6	BHEL SCOPE
3.	Manufacturing Time	8	14	BY SUPPLIER
4.	Inspection call	1	15	BY SUPPLIER
5.	Inspection by BHEL/Customer	1	16	BHEL SCOPE
6.	Issue of Dispatch clearance	2	18	BHEL SCOPE
7.	Dispatch	2	20	BY SUPPLIER
8.	ETC WORKS	10	30	COMPLETION OF WORKS FROM THE DATE OF SITE CONFIRMATION/ READINESS OF FRONTS.

1. Inspection call to be issued 2 weeks in advance.
2. Supplier must ensure the completeness and correctness of the requisite documents before submission for approval. Delay in approval on account of incomplete / inadequate information shall be the responsibility of supplier.
3. Inspection call should be given in the prescribed format only. Inspection calls not in the prescribed format shall not be entertained.
4. Qty to be offered for inspection should be in accordance within Delivery-schedule – lot. BHEL reserves the right not to entertain multiple inspection calls for a Delivery – lot and delay on this account shall be the responsibility of Supplier.

Signature & Seal of

Supplier

Date:



**BHARAT HEAVY ELECTRICALS LTD.
(TRANSMISSION BUSINESS GROUP)**

GENERAL TERMS AND CONDITIONS FOR TENDER ENQUIRY / CONTRACT

This is to be submitted duly signed by bidder in original. Clause-wise deviations and / or additional conditions / clarifications, if any, are to be brought out clearly in "Schedule of Commercial Deviation". Deviations and / or additional conditions / clarifications, if any, mentioned elsewhere in the bid / offer, shall not be considered.

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1.	INSTRUCTION TO BIDDERS : 1.1 Sealed bids are invited for the items mentioned in the tender enquiry conforming to the NIT including Technical Specifications. Bids should be typed and free from overwriting and erasures. Corrections or additions / deletions, if any, must be clearly written and attested, otherwise offer may be rejected. 1.2 Bidder must ensure that their bid is submitted / dropped in the tender box on or before 14-00 Hrs. IST on the due date of opening, unless otherwise specified in the NIT, at the address as follows :- Tender Box, Materials Management, Transmission Business Group, Bharat Heavy Electricals Limited, 5th Floor, Tower-A, Advant Navis IT Business Park, Plot-7, Sector-142, Noida Expressway, Noida, Dist. G. B. Nagar, U. P. – 201305 1.3 In case tender enquiry is floated through the e-procurement system, offer / bid has to be submitted through the e-procurement system ONLY as per instructions given in the e-procurement portal (https://bhel.abcprocure.com). 1.4 The bids shall be opened at 14-30 Hrs. IST on the due date of opening, in the presence of participating bidders who may like to be present, unless otherwise specified in the NIT. Bids received late are liable for rejection. Bidders sending bids by courier or post will have to ensure that it is timely delivered at the above address. 1.5 Bids are to be submitted duly signed with seal in two parts :- a) Techno-commercial Bid (Part-I) – To be submitted in 2 sets (original + copy). A copy of Price Bid (Part-II) clearly mentioning all the necessary information as per format without prices "Un-Priced Bid" is also to be enclosed in Part-I Bid. b) Price Bid (Part-II) – To be submitted only in one set in a separate sealed envelope. This should not contain any Technical and / or Commercial Terms and Conditions. The rates should be quoted both in figures and words. 1.6 The Part-I and Part-II Bids are to be sealed in separate envelopes and

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	marked as "Techno-commercial Bid (Part-I)" and "Price Bid (Part-II)" respectively. Both the envelopes are to be kept in another common envelope and marked as "BID". Each envelope should be sealed and superscribed with tender enquiry no., item / package name, project name and due date of opening. Bidder's name and address shall also be mentioned on each envelope. 1.7 For any technical clarification, please contact official mentioned in the tender enquiry / NIT. 1.8 For any commercial clarification please contact official issuing tender enquiry / NIT. 1.9 Price bid (Part-II) should not contain any additional information / description other than given in "Un-Priced Bid" submitted with "Techno-commercial Bid (Part-I)" except prices, otherwise bid is liable for rejection. 1.10 Price Bid submitted along with the bid shall remain valid up to validity of offer. Any discount / revised offer submitted by the bidder on its own shall be accepted provided it is received before the due date and time of offer submission (i.e. Part-I Bid). The discount shall be applied on pro-rata basis to all items including optional items, if any, unless specified otherwise by the bidder. Discount offered shall be valid for full duration of validity of the offer including extension of validity, if any. Unsolicited Supplementary / Revised Price Bid submitted after the due date and time of offer submission (i.e. Part-I Bid), during validity period of offer, unless asked by BHEL, shall not be considered. Withdrawal of quotation by the bidder, at any stage after its opening, may entail suitable action against such bidder by BHEL. 1.11 The consultants / firm (and any of its affiliates) shall not be eligible to participate against tender enquiry for the related goods or works or services for the same project, if they were engaged by BHEL-TBG for the consultancy services. 1.12 In case any Foreign OEM / Foreign Principal insists on engaging the services of an agent, such agent shall not be allowed to represent more than one manufacturer / supplier in the same tender. Moreover, either the agent could bid on behalf of the manufacturer / supplier or the manufacturer / supplier could bid directly but not both. In case bids are received from the manufacturer / supplier and the agent, bid received from the agent shall be ignored. 1.13 Non-conformities / errors / discrepancies in quoted prices in price bids shall be dealt as follows :- a) If, in the price structure quoted for the required goods / services / works, there is discrepancy between the unit price and the total price (which is obtained by multiplying the unit price by the quantity), the unit price shall prevail and the total price corrected accordingly, unless in the opinion of BHEL there is an obvious misplacement of the decimal point in the unit price, in which case the total price as quoted shall govern and the unit price corrected accordingly. b) If there is an error in a total corresponding to the addition or subtraction of subtotals, the subtotals shall prevail and the total shall be corrected.

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	c) If there is a discrepancy between words and figures, the amount in words shall prevail, unless the amount expressed in words is related to an arithmetic error, in which case the amount in figures shall prevail subject to (a) and (b) above. d) If there is such discrepancy in an offer as mentioned in (a), (b) & (c) above, the same shall be conveyed to the bidder with target date upto which the bidder has to send his acceptance on the above lines and if the bidder does not agree to the decision of the BHEL, the bid is liable to be ignored. 1.14 In case the scope of the successful bidder / supplier against this tender enquiry includes Erection, Testing and Commissioning (ETC) of the equipment / material at site in addition to Supply, Purchase Order shall be placed for Supply Portion and Contract shall be separately awarded for ETC at Site Portion. General Terms and Conditions for Tender Enquiry / Contract mentioned herein shall be applicable for both Supply & ETC at Site. Additional Terms and Conditions for Tender Enquiry / Contract for Erection, Testing and Commissioning at Site "BHEL/TBG/GTC-ETC/2016 REV01" shall be applicable for ETC at Site only which is to be read in conjunction with General Terms and Conditions for Tender Enquiry / Contract mentioned herein. However, any breach of either the Purchase Order or the Contract shall be deemed to be breach of the other. 1.15 Taxes and Duties payable extra as per Clause No. 2.3 in NIT, if not specified/quoted clearly as extra shall be considered as included in Ex-works Price and therefore shall not be reimbursed. Taxes and duties not payable extra as per NIT shall be deemed to be included in Ex-works Price. 1.16 If the rates for taxes and duties in respect of the quoted materials and / or services assumed by the Supplier are less than the tariff prevailing at the time of tendering, Supplier will be responsible for such under quotations. However if the rates assumed are higher than the correct rates prevailing at the time tendering, the difference will be to the credit of BHEL. Note : Representative / official deputed by the bidder to witness tender opening must produce authorization letter for the same.
2.	PRICES : 2.1 Unless specifically indicated in the NIT, all prices shall be FIRM. No enhancement of rate for whatsoever reasons unless and until asked by BHEL shall be allowed. 2.2 Unless specifically indicated in the NIT, the prices shall be on INR basis. 2.3 Unless specifically indicated in the NIT, the prices are to be quoted on FOR (Site / Destination) basis excluding GST. The break-up of prices shall be as under :- a) Ex-works Price: Ex-works price including packing & forwarding charges.

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	b) Freight: Freight for door delivery up to destination / site / store are to be quoted separately. c) Insurance: Insurance for door delivery up to destination / site / store are to be quoted separately. d) Type Test Charges: If asked in the technical specification, it is to be quoted separately for each test. e) Charges for Supervision of Erection, Testing & Commissioning (ETC) at Site: To be quoted separately if specified in NIT/Price Schedule. f) Charges for Testing & Commissioning at Site: To be quoted separately if specified in NIT/Price Schedule. g) Charges for Erection, Testing & Commissioning at Site: To be quoted separately if specified in NIT/Price Schedule. h) Training Charges: To be quoted separately if specified in NIT/Price Schedule. 2.4 GST rates along with HSN/SAC code as applicable on Sr No (a) to (h) above is to be mentioned separately in percentage in both un-priced bid and price bid. Note : i) Unless otherwise specified in the NIT, the purchase order shall be placed on Ex-works basis for Indian bidders. ii) Prices quoted by Indian bidders shall be in Indian Rupees only. iii) In case Supervision of Erection, Testing & Commissioning (ETC) at Site or Testing & Commissioning at Site or Erection, Testing & Commissioning at Site is also in scope of the bidder along with supply, bidder has to ensure that prices quoted for such services also are in line with special terms & conditions of the NIT, if any. iv) Unless otherwise specified in the NIT, Unloading at Site / Destination shall not be in the scope of the supplier. v) Prices in respect of Sr No (a) to Sr No (h) of Clause 2.3 above are to be quoted inclusive of all taxes & Duties, charges. Levies , royalty etc if any, excluding GST.
3.	TERMS OF PAYMENT : 3.1 For Supply only in scope of the supplier 100% of payment within 60 days from the date of receipt of complete invoice along with documents in 3 sets (original + 2 copies) as follows : · LR / GR duly endorsed by BHEL Site Official. · Material Receipt Certificate issued by BHEL Site Official. · GST Compliant Tax Invoice · Packing List (Case-wise) · Copy of Transit Insurance Certificate from underwriters. · Material Inspection Clearance Certificate (MICC) issued by BHEL Quality Management · Guarantee Certificate · Copy of Performance Bank Guarantee (PBG) · Certificate of acceptance of Type Test Reports issued by BHEL Engineering Management wherever specifically mentioned in the Purchase Order.

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	3.2 For Supply where Supervision of Erection, Testing & Commissioning (ETC) at Site is in scope of the supplier or Supply where Testing & Commissioning at Site is in scope of the supplier a) 95% of payment within 60 days from the date of receipt of complete invoice along with documents in 3 sets (original + 2 copies) as follows : · LR / GR duly endorsed by BHEL Site Official. · Material Receipt Certificate issued by BHEL Site Official. · GST Compliant Tax Invoice · Packing List (Case-wise) · Copy of Transit Insurance Certificate from underwriters. · Material Inspection Clearance Certificate (MICC) issued by BHEL Quality Management · Guarantee Certificate · Copy of Performance Bank Guarantee (PBG) · Certificate of acceptance of Type Test Reports issued by BHEL Engineering Management wherever specifically mentioned in the Purchase Order. b) 5% of payment within 60 days from the date of receipt of complete invoice along with documents in 3 sets (original + 2 copies) as follows : · Certificate of successful completion of Supervision of Erection, Testing & Commissioning at Site if it is in the scope of the supplier or Certificate of successful completion of Testing & Commissioning at Site if it is in the scope of the supplier. · Certificate of completion of final documentation as per Purchase Order / Technical Specification issued by BHEL Engineering Management 3.3 For Supply where Erection, Testing & Commissioning (ETC) at Site is in scope of the supplier a) 90% of payment within 60 days from the date of receipt of complete invoice along with documents in 3 sets (original + 2 copies) as follows : · LR / GR duly endorsed by BHEL Site Official. · Material Receipt Certificate issued by BHEL Site Official. · GST Compliant Tax Invoice · Packing List (Case-wise) · Copy of Transit Insurance Certificate from underwriters. · Material Inspection Clearance Certificate (MICC) issued by BHEL Quality Management · Guarantee Certificate · Copy of Performance Bank Guarantee (PBG) · Certificate of acceptance of Type Test Reports issued by BHEL Engineering Management wherever specifically mentioned in the Purchase Order b) 10% of payment within 60 days from the date of receipt of complete invoice along with documents in 3 sets (original + 2 copies) as follows : · Certificate of successful completion of Erection, Testing & Commissioning at Site issued by BHEL Site Official / Construction Management · Certificate of completion of final documentation as per Purchase Order / Technical Specification issued by BHEL Engineering Management 3.4 For Type Test Charges 100% payment along with applicable GST within 60 days from the date of receipt

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	of complete GST compliant Tax invoice along with copy of Certificate of acceptance of Type Test Reports issued by BHEL Engineering Management in 3 sets (original + 2 copies) on completion of delivery (at site, if F&I is in scope of supplier) of main supplies (excluding spares) for which Type Tests are applicable. List of main supplies (excluding spares) for which Type Tests are applicable shall be certified by BHEL Engineering Management. 3.5 For Charges for Supervision of Erection, Testing & Commissioning at Site 100% payment along with applicable GST within 60 days from the date of receipt of complete GST compliant Tax invoice along with certificate of successful completion of Supervision of Erection, Testing & Commissioning at Site issued by BHEL Site Official / Construction Management in 3 sets (Original + 2 copies). 3.6 For Charges for Testing & Commissioning at Site 100% payment along with applicable GST within 60 days from the date of receipt of complete GST compliant Tax invoice along with certificate of successful completion of Testing & Commissioning at Site issued by BHEL Site Official / Construction Management in 3 sets (Original + 2 copies). 3.7 For Training Charges 100% payment along with applicable GST within 60 days from the date of receipt of complete GST compliant Tax invoice along with certificate of completion of training issued by BHEL Engineering Management in 3 sets (original + 2 copies). Note : i) Supplier has to submit invoice(s) as per PO or approved billing break-up of prices (if applicable as per NIT). ii) In case of supplies for overseas project, Material Receipt Certificate issued by BHEL Authorized Representative shall also be acceptable. iii) In case of Transit Insurance under Open Insurance Policy, Intimation / Declaration of Transit Insurance as per terms of the relevant Open Insurance Policy along with copy of Open Insurance Policy from underwriters shall also be acceptable. iv) Supplier has to ensure commencement of transit insurance from the date not later than LR / GR date. v) Supplier has to submit Tax Invoice(s). Supplier should ensure that Tax Invoice should comply all statutory requirements under GST Law to enable BHEL to avail input credit vi) MSMED Act, 2006 and the rules made thereunder as amended from time to time shall be applicable for release of payment to suppliers qualified & registered as Micro & Small Enterprises based on documents mentioned in the NIT for MSME. vii) Supplier has to submit PBG (as per BHEL format) & Guarantee Certificate as per

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	PO terms. viii) In case any shortages and / or damages in supplies, an amount calculated based on comments against Material Receipt Certificate issued by the BHEL Site Official shall be withheld from the supply payment against 3.1(a) or 3.2(a) above to be deemed fit by BHEL subject to a minimum of 10% of the total ex-works value of the invoice corresponding to the LR / GR against which any shortages and / or damages are reported. The withheld amount shall be released after the shortages and / or damages in supplies are supplied / replenished against Certification by BHEL Site Official. ix) Payment of GST component shall be made only if vendor has deposited the Tax and credit for the same is reflected in GSTN (GST Network). In case credit of the same is not reflected in GSTN , vendor may alternatively furnish BG of GST Amount for a period valid for not less than 1 month .In case of disallowance of credit /non reflection of credit in GSTN , amount will be recovered from supplier along with applicable Interest , penalty etc from any of his dues. x) If GST is payable by BHEL on reverse Charge Mechanism basis, vendor should ensure the submission of GST compliant Tax invoice immediately on dispatch/ performance of service. In case of non-compliance any additional charges towards interest , penalty etc , will be to vendors account. xi) TDS under GST Act, if applicable, shall be deducted unless Exemption Certificate If applicable, from the appropriate authority is furnished to BHEL along with Invoice.
4.	INTEREST LIABILITY : In case of any delay in payment due to any reason, BHEL shall not pay any interest on delayed payment. Also, no interest shall be payable by BHEL on the bank guarantee / deposit amount or balance payment or any other money which may become due owing to difference or misunderstanding or any dispute before any quasi judicial authority between BHEL and the Supplier / Contractor.
5.	GUARANTEE : The equipment / material supplied and services rendered (if applicable) shall be guaranteed to be free from all defects and faults in design & engineering, material, workmanship & manufacture and in full conformity with the Purchase Order / Contract, Technical Specifications & approved drawings / data sheets, if any, for 18 months from the date of last delivery or 12 months from the date of commissioning, whichever is earlier. Wherever Erection, Testing & Commissioning at Site are also in the scope of the Supplier, the guarantee period shall be 18 months from the date of last delivery or 12 months from the date of commissioning, whichever is later. The defective equipment / material / component shall be replaced free of cost at site. Freight & Insurance during transit shall also be in the scope of the supplier / contractor. Any expenditure for dismantling and re-erection of the replaced equipment / material / component shall be to supplier's / contractor's account. All replacements during the guarantee period shall be delivered at site promptly and satisfactorily within a period not more than 45 days from the date of reporting the defect / rejection etc. In the event of the supplier / contractor failing to replace the defective equipment / material / component within the time period mentioned above, BHEL may proceed to

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	undertake the replacement of such defective equipment / material / component at the risk and cost of the supplier / contractor without prejudice to any other rights under the contract and recover the same from PBG / other dues of this Purchase Order / Contract or any other Purchase Order / Contract executed by the supplier / contractor. Note : i) In case of Illumination System, items viz. Lamps, Tubes, Ballast, Starters, Capacitors & Fuses will not be under Guarantee after commissioning. ii) In addition to the above guarantee period, Extended Guarantee / Warranty, if any, shall be as per NIT / Technical Specifications. iii) In case offer of agent of Foreign OEM / Foreign Principal is considered, as per Clause No. 1.12 above, Guarantee as mentioned above has to be provided by the Foreign OEM / Foreign Principal also.
6.	LATENT DEFECT : Liability for latent defects shall be for defects inherently lying within material or arising out of design deficiency which does not manifest itself during guarantee period but later and shall be limited to five years from the expiry of the guarantee period.
7.	PERFORMANCE BANK GUARANTEE (PBG) : Supplier shall arrange to submit Performance BG / deposit on a non-judicial stamp paper of appropriate value along with first invoice or within 60 days from placement of Purchase Order (PO) whichever is earlier, in line with one of the applicable options as follows :- <u>Option "A"</u> A single rolling PBG for Rs. 50 Lakhs initially valid for 18 months with claim period of 3 months extra over and above 18 months for all the Purchase Orders being executed for Transmission Business Group, BHEL. However, validity of the PBG shall be extended till 18 months from the date of last delivery with 3 months claim period extra over and above 18 months. Single Rolling PBG option shall not be applicable in case Ex-works value of the PO at the time of placement of PO exceeds Rs. One Crore. <u>Option "B"</u> PBG for 10% of the total Ex-works PO value, valid for 18 months from the date of last delivery with claim period of 3 months extra over and above 18 months. Ex-works PO value at the time of placement of PO shall be considered for calculation of the PBG amount. <u>Option "C"</u> In case the total Ex-works PO value at the time of placement of PO does not exceed Rs. Ten Lakhs, interest free Deposit of 10% of the total Ex-works PO value at the time of placement of PO in form of Demand Draft favouring "Bharat Heavy Electricals Limited" and payable at New Delhi / Delhi / Noida shall also be acceptable to BHEL in lieu of PBG, which shall be released after expiry of 21 months from the date of last delivery after deduction, if any, within 60 days from receipt of invoice in 3 sets (original + 2 copies) to be submitted by the supplier. Note : i) The Bank Guarantee shall be from any bank as per Annexure for List of Banks (32 Nos.). The original PBG should be sent by issuing Bank directly to AGM (Finance), TBG, BHEL, Noida. ii) Extension of validity of the PBG in original, as per above clause, should be sent by issuing Bank directly to AGM (Finance), TBG, BHEL, Noida at least 45 days

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	before expiry of validity of the PBG. iii) Unless otherwise specified in the NIT, deviation taken for non-submission of PBG / Deposit, as applicable, shall not be accepted. iv) Supplier has to confirm one of the applicable options for submission of PBG / Deposit before placement of PO. v) In case of non-submission PBG / Deposit, as applicable, BHEL reserve the right for Risk Purchase as per terms of the NIT and impose Suspension of Business Dealings with the Supplier / Contractor. vi) BHEL reserve the right to encash the Bank Guarantee and forfeit the amount in the event of any default, failure or neglect on part of the Supplier in fulfilment of performance of the Purchase Order. vii) Value of the Bank Guarantee (at the time of submission) shall remain unchanged for any subsequent variations in Purchase Order value up to $\pm 20\%$. Beyond this variation of $\pm 20\%$, the Supplier shall arrange to enhance or may reduce the value of the Bank Guarantee accordingly for the total variation promptly. viii) Vendor to ensure submission of Certificate of Final Documentation /Confirmation regarding Non applicability of Final Documentation, as the case may be, as referred in clause No 9 regarding Final Documentation. BG shall be released only after submission of the same to BHEL TBMM.
8.	SUBMISSION OF DRAWINGS / DOCUMENTS FOR APPROVAL : Supplier shall submit the master document list within 7 days from date of Purchase Order / Contract, unless otherwise specified in the NIT, with planned dates for submission which shall be in line with activity schedule as per Purchase Order / Contract and shall be finalized with BHEL Engineering Management. Date of first submission of drawings / documents shall be certified by BHEL Engineering Management after the receipt of applicable drawings / documents (e.g. project specific cover sheet, GTP, OGA drawings, schemes, type test reports etc.) by BHEL. During detailed engineering stage, necessary hard copies of the engineering drawings / documents shall also be submitted by the supplier as per the Purchase Order / Contract requirement. The supplier shall also submit the packing drawings as per technical specifications. In case item(s) offered require any interface details of other item (not in the scope of supplier & required for operating the equipment), the supplier has to submit interfaces schedule along with submission of engineering drawings / documents. It shall be responsibility of the supplier to get the details of the interfaced item from BHEL before manufacturing to avoid any mismatch at site.
9.	FINAL DOCUMENTATION : Final documentation as called in the Technical /contract specification is to be submitted within 3 months from the date of first delivery of respective equipment, item/material. After submission of Final Documentation, BHEL Engineering Management (TBEM) will issue a Certificate of Completion of Final Documentation. Wherever Final Documentation is not applicable, BHEL Engineering Management (TBEM) will issue confirmation regarding the same, Vendor to submit the Certificate of Final Documentation /Confirmation regarding Non applicability of Final Documentation, as the case may be, to BHEL TBMM. In case of Non Submission of Certificate of Final Documentation /Confirmation regarding Non applicability of Final Documentation, BG will be liable for encashment.
10.	INSPECTION : BHEL / customer / third party shall inspect equipment / material before despatch. Stage inspection during manufacturing may also be carried out. Material to be despatched only after getting Material Despatch Clearance Certificate (MDCC) / MICC issued by BHEL. Supplier shall send inspection call on prescribed format / web site only, with an

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	advance notice of 15 days. Supplier to ensure submission of all routine / acceptance test reports, inspection reports and all other documents related to inspection, immediately to BHEL. BHEL representative is authorised to carry out audits along with Third Party Inspection Agency at vendor's / supplier's works before clearing the items for despatch.
11.	DESPATCH DOCUMENTS : Despatch documents to be immediately sent to BHEL on despatch are as follows :- • Copy of Invoice • Copy of LR / GR in case of Indian suppliers or BL / AWB in case of foreign suppliers • Copy of Packing List (Case-wise) • Copy of Transit Insurance Certificate from underwriters • Copy of Guarantee Certificate
12.	DELIVERY PERIOD : Delivery / Completion requirement shall be mentioned in the NIT. Bidder to specify best delivery / completion period possible in weeks from the date of LOI / PO as per activity schedule for consideration by BHEL. Time required for type test, if applicable, is to be separately indicated. Note : LR / GR date or invoice date (whichever is later) for indigenous supplies and BL / AWB date for FOB / CIF (if applicable) contracts shall be considered as delivery date.
13.	LIQUIDATED DAMAGES FOR DELAYED DELIVERY: In case of delay in execution of Purchase Order beyond the contractual delivery time, an amount of 0.5% of the total Purchase Order value for supply (incl. taxes and duties, freight & insurance as applicable) per week of delay or part thereof subject to a maximum of 10% of the total Purchase Order value for supply (incl. taxes and duties, freight & insurance as applicable) shall be deducted as Liquidated Damages (LD) along with applicable GST (if any) on LD. However, in case of staggered (lot-wise) contractual delivery schedule, an amount of 0.5% of the total delayed lot value for supply (incl. taxes, duties, freight & insurance as applicable) per week of delay or part thereof subject to maximum of 10% of the total delayed lot value (Incl taxes, duties, Freight & Insurance as applicable) shall be deducted as Liquidated Damages (LD) along with applicable GST (if any) on LD. Note : i) In case of any amendment / revision in P.O./WO, the LD shall be linked to the amended / revised Purchase Order / Contract value and delivery / completion time / schedule, if applicable. ii) LR / GR date or invoice date (whichever is later) for indigenous supplies and BL / AWB date for FOB / CIF (if applicable) for imported supplies shall be treated as the date of dispatch for levying LD as above. iv) However, for indigenous supply, if time period between date of receipt of material at site / destination by Site Official & the date of LR / GR or invoice (whichever is later) is more than 30 days, where distance from place of despatch as per LR / GR is upto 1000 Kms or if time period between date of receipt of material at site / destination by Site Official & the date of LR / GR or invoice (whichever is later) is more than 45 days, where distance from place of despatch as per LR / GR is more than 1000 Kms, such excess period shall also be considered for LD

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	purpose. iv) If, as per supplier, delay is not attributable to the supplier, delay analysis with documentary evidence may be submitted by the supplier at the earliest but not later than six months from the end of the financial year in which the payment is withheld. Based on the above details / documents submitted by the supplier, BHEL shall take final decision and if considered appropriate by BHEL, withheld amount (full or part as the case may be) shall be released, otherwise, full or balance withheld amount shall be treated as deduction of Liquidated Damages (LD) towards delayed delivery.
14.	VALIDITY OF OFFER : The offer shall be valid for 120 days from the due date of opening of tender (i.e. techno-commercial bid unless otherwise specified in the NIT). Prices of Spares, wherever they optional items, shall be valid till two years from the date of placement of PO.
15.	ACCEPTANCE / REJECTION OF TENDER : BHEL reserve the right to reject in full or part, any or all tender without assigning any reason thereof. BHEL also reserve right to vary the quantities as mentioned in the NIT. Acceptance of offer is subject to vendor approval by customer before opening of price bid. BHEL shall not be bound by any power of attorney granted by tenderer or by changes in composition of the firm made subsequent to award of order / contract. BHEL may however recognize such power of attorney and changes after obtaining proper legal advice, cost of which will be chargeable to the seller / contractor concerned. If the tenderer deliberately gives wrong information, BHEL reserves the right to reject such an offer at any stage or cancel the order / contract, if awarded, and forfeit the security deposit and bank guarantee.
16.	DEVIATION : The bids having deviation(s) w.r.t. tender are liable for rejection. However, BHEL, at its discretion, may load the prices for evaluation of offer with prior intimation to bidder.
17.	TENDER EVALUATION : Comparative statement shall be prepared and evaluated on total cost basis at destination/site (as per terms of NIT) considering overall quantity indicated in NIT unless contrary to same is specifically mentioned in the tender enquiry / NIT. Total cost for this purpose shall include cost of scope of work as mentioned in NIT along with applicable taxes & duties, and other services etc. (if applicable). GST input credit available to BHEL shall be reduced from prices while determining L1 status. In case all bidders are foreign & Port of Import (destination port) is same for all the bidders, evaluation of offers shall be done on CIF (Port of Import) basis. Otherwise, evaluation of offers shall be done on the basis of delivered cost at site /destination to BHEL. Further, in case of foreign bidders, marine freight & insurance are to be quoted separately & the purchase order may be placed on FOB basis with an option for delivery on CIF / CFR basis, if required, later. In case of foreign bidders, Exchange Rate (TT selling rate of State Bank of India) as on date of tender opening (Part-I Bid in case of two part bid) shall be considered. If the relevant day happens to be a bank holiday, then the forex rate as on the previous bank (SBI) working day shall be taken for tender evaluation.
18.	LOADING CRITERIA : List of permissible deviations & loading criteria thereof are as follows :- a) Payment Terms Base rate of SBI (as applicable on the date of bid opening / techno-commercial bid opening in case of two part bids) + 6% shall be considered for loading for the

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	period of relaxation sought by bidder(s) against terms of payment in the NIT. b) Liquidated Damages (LD) for Delayed Delivery Loading on LD clause shall be to the extent to which it is not agreed to by the bidder (at offered value). c) In case of foreign bidders, if the quoted prices is on CIF basis only, it shall be loaded to arrive at total FOR (Site / Destination) price, as applicable, by factors as follows :- i) Port handling / clearing charges: @ 1% of CIF value to arrive at Customs Assessable Value. ii) Custom Duty (including CVD & SAD) as per NIT prevailing on date of price bid opening. iii) Inland Freight & Transit Insurance: @ 5% of CIF value where distance between site / destination and Port of Discharge is upto 1000 Kms or @ 7% of CIF value where distance between site / destination and Port of Discharge is more than 1000 Kms. Note : Additional deviations (if considered acceptable by BHEL) & the loading criteria shall be communicated to all the qualified bidders before price bid opening.
19.	ARBITRATION : In the event of any dispute emanating from and relating to this contract, the matter shall be referred to the sole arbitration of the person appointed by the competent authority of BHEL. Subject to aforesaid, the provisions of "The Arbitration and Conciliation Act, 1996" and the rules made thereunder as amended from time to time in India shall apply to the arbitration proceedings. The venue of arbitration shall be in New Delhi. Further there shall be no claim for any pre-reference or pendente-lite interest on the claims and any claim for such interest made shall be void. However, in case of contract with Public Sector Enterprise / Undertaking (PSE/PSU) or Govt. Dept., the extant guidelines of Govt. of India shall be followed.
20.	LEGAL SETTLEMENT : Indian Courts at New Delhi / Delhi shall have exclusive jurisdiction to decide the dispute, if any, arising out of or in respect of the contract(s) to which these conditions are applicable. Contract, including all matters connected with contract, shall be governed by the Indian Law, both substantive and procedural, for the time being in force including modification thereto.
21.	SUB-CONTRACTING : In case further subcontracting of BHEL Purchase Order / Contract or part thereof is envisaged by supplier, the same can be done after written permission is obtained from BHEL. However it shall not absolve the Supplier / Contractor of the responsibility of fulfilling BHEL Purchase Order / Contract requirements. In case of subcontracting of Purchase Order / Contract awarded by BHEL or part thereof without such permission, BHEL reserve the right to cancel the Purchase Order / Contract and source such material / component / equipment / system from any other agency at the risk and cost of the Supplier / Contractor. If Supplier / Contractor is an individual or proprietary concern and the individual or the proprietor dies or the partnership is dissolved or substantially affected, then unless BHEL is satisfied that legal representative of individual Supplier / Contractor or proprietor of proprietary concern and surviving partners of partnership firm are capable of carrying out and completing the Purchase Order / Contract, BHEL shall be entitled to cancel the Purchase Order / Contract as to its incomplete portion and without being in any way liable to payment of any compensation to legal

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	representative of Supplier / Contractor and / or to surviving partners of Supplier's / Contractor's firm on account of cancellation of the Purchase Order / Contract. Decision of BHEL that legal representatives of deceased Supplier / Contractor or surviving partners of the Supplier's / Contractor's firm cannot carry out and complete the Purchase Order / Contract shall be final and binding on the parties hereto. Terms and Conditions shall not get affected in case of de-merger / amalgamation / taking-over / re-constitution etc.
22.	RISK PURCHASE : In case the Supplier / Contractor fails to supply or fails to comply with terms & conditions of the Purchase Order / Contract or delivers equipment / material not of the contracted quality or fails to adhere to the contract specifications or fails to perform as per the activity schedule and there are sufficient reasons even before expiry of the delivery / completion period to justify that supplies shall be inordinately delayed beyond contractual delivery / completion period, BHEL reserve the right to cancel the Purchase Order / Contract either in whole or in part thereof without compensation to Supplier / Contractor and if BHEL so desires, may procure such equipment / material / items not delivered or others of similar description where equipment / material / items exactly complying with particulars are not readily procurable in the opinion of BHEL which is final and in such manner as deemed appropriate, at the risk and cost of the Supplier / Contractor and the Supplier / Contractor shall be liable to BHEL for any excess cost to BHEL. However, the Supplier / Contractor shall continue execution of the Purchase Order / Contract to the extent not cancelled under the provisions of this clause. Recovery amount on account of purchases made by BHEL at the risk and cost of Supplier / Contractor shall be the difference of total value of new Purchase Order (PO) value and total value of old Purchase Order for applicable items, where the total value of new PO is more than total value of old PO for applicable items, plus additional 15% of the total ex-works value of new PO as overheads. The Supplier / Contractor shall on no account be entitled to any gain on such risk & cost purchase. In case the purchase order (PO) value of the new PO is less than the PO value of the old PO, 15% of the total ex-works value of the new PO shall be recovered as overheads and the difference between the PO value of the old PO and the new PO shall not be considered for calculation of the recovery amount.
23.	ADJUSTMENT OF RECOVERY : Any amount payable by the Supplier / Contractor under any of the condition of this contract shall be liable to be adjusted against any amount payable to the Supplier / Contractor under any other Purchase Order / Contract awarded to him by any BHEL unit. This is without prejudice to any other action, as may be deemed fit, by BHEL.
24.	FORCE MAJEURE CONDITION : If by reason of war, civil commotion, act of god, Government restrictions, strike, lockout which are not in control of Supplier / Contractor the deliveries / services are delayed, Supplier / Contractor shall not be held responsible. If at any time during the continuance of the Purchase Order / Contract, the performance in whole or in part by either party of any obligations under the Purchase Order / Contract is prevented or delayed by reason of any war hostilities, acts of the public enemy, restrictions by Govt. of India, civil commotion, sabotage, fires, floods, explosion, epidemics, quarantine restrictions, strike, lock-outs or acts of God (hereinafter referred to as "event"), which are not in control of Supplier / Contractor or BHEL, then provided notice of the happening of such event is given by either party to the other within fifteen (15) days from the date of occurrence thereof, neither party shall by reason of such event be entitled to terminate the Purchase Order /

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	Contract nor shall have any claim for damages against each other in respect of such non-performance and delay in performance. Performance under the Purchase Order / Contract shall be resumed immediately after such event has come to an end or ceased to exist and decision of BHEL as to whether the deliveries have to be resumed or not shall be final, conclusive and binding on the parties hereto. In the event of the parties hereto not able to agree that a force majeure event has occurred, the parties shall submit the disputes for resolution pursuant to the provisions hereunder, provided that the burden of proof as to whether a force majeure event has occurred shall be upon the party claiming such an event. Notwithstanding above provisions, BHEL shall reserve the right to cancel the Purchase Order / Contract, wholly or partly, in order to meet the overall project schedule and make alternative arrangements for completion of delivery and other schedules.
25.	MANUFACTURING QUALITY PLAN (MQP) : Supplier to submit approved MQP in line with requirement of BHEL/customer.
26.	SUPPLIER PERFORMANCE MONITORING AND RATING SYSTEM : BHEL reserve the right for evaluation of Supplier Performance Rating as per Supplier Performance Monitoring and Rating System of BHEL for necessary action. Details are available at BHEL Website www.bhel.com for reference.
27.	DEALING WITH BANNED SUPPLIERS / CONTRACTORS IN BHEL : Offers of the bidders, who are on the banned list, as also the offers of the bidders who engage the services of the banned firms, shall be rejected. The list of banned firms is available on BHEL website www.bhel.com for reference.
28.	ORDER OF PRECEDENCE : The order of precedence shall be as follows :- a) Special Terms & Conditions (STC) for Tender Enquiry / Contract, if any b) General Terms & Conditions (GTC) for Tender Enquiry / Contract & Additional General Terms & Conditions (GTC) for Tender Enquiry / Contract for Erection Testing & Commissioning (ETC) at Site, if applicable Provisions in (a) above shall prevail over (b). In case of conflict, between Technical Specifications and STC / GTC, bidder to seek necessary clarifications from BHEL concerned official as specified in NIT.
29.	PACKING : Packing shall be in conformity with specifications and shall be such as to ensure prevention of damages, corrosion, deterioration, shortages, pilferage and loss in transit or storage. In case of shipment by sea or air, the packing shall be sea-worthy or air-worthy respectively and of international standards. Different types of spares i.e. start-up / commissioning spares and initial spares (mandatory spares and recommended O&M spares) are to be packed separately. Packing List shall be submitted as per standard format along with advance set of documents for claiming payment which shall also indicate :- a) Case / Packing size (as applicable). b) Gross weight and net weight of each package. c) Detailed contents of the package with quantity of each item separately. Project, Item / Package Description, BHEL's PO No. with date & Case / Packing Mark should also be clearly mentioned on the Case / Packing and Packing List for identification. Also, Packing List must be duly signed & should include respective Invoice No. & LR No. Note : Foreign suppliers to furnish details to arrange inland transportation by BHEL, if applicable, as follows :-



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	i) No. of Packages ii) Size with Weight (Gross & Net) of each Package iii) No. of Containers with type & size required for inland transportation iv) Type of Cargo (Break Bulk / LCL / FCL) v) Customs Tariff No.
30.	COLOUR CODING : Aluminium stickers are required to be attached to large components but plastic sheet tags should be tied with small components, giving details like purchase order, description of the component, quantity etc. Tags should be of the colour as follows :- a) Main equipment : Yellow or White tag b) Start-up / Commissioning spares : Blue tag c) Mandatory spares : Pink or Red tag d) Recommended / O&M spares : Green tag
31.	MICRO, SMALL & MEDIUM ENTERPRISES (MSME) : MSME Act 2006 as amended from time to time & extant regulations of Govt. of India for MSME will be applicable. Micro & Small Enterprises (MSE) can avail the intended benefits only if they submit along with the offer / bid, attested copies of either Acknowledgement of Entrepreneur Memorandum Part-II (EM-II certificate) having deemed validity (five years from the date of issue of acknowledgement in EM-II) or valid NSIC certificate or EM-II certificate along with attested copy of a CA certificate (As per BHEL format where deemed validity of EM-II certificate of five years have expired) applicable for the relevant financial year (latest audited). Date to be reckoned for determining the deemed validity will be the date of opening (for Techno-commercial Bid : Part-I in case of two part bid). Non-submission of such documents will lead to consideration of their bid at par with other bidders. No benefit shall be applicable for this enquiry if any deficiency in the above required documents are not submitted before price bid opening. If the tender is to be submitted through e-procurement portal, then the above required documents are to be uploaded on the portal. Documents should be notarized or attested (in original) by a Gazetted officer. Copy of Udyog Aadhaar Memorandum with Acknowledgement of Ministry of Micro, Small & Medium Enterprises should also be furnished.
32.	BUSINESS ETHICS / SUSPENSION OF BUSINESS DEALINGS WITH SUPPLIERS / CONTRACTORS : If any bidder / supplier / contractor during pre-tendering / tendering / post tendering / award / execution / post-execution, indulges in malpractices cheating, bribery, fraud or other misconduct or formation of cartel so as to influence the bidding process or influences the price or fails to perform or is in default without any reasonable cause etc or performs any act considered objectionable as per extant guidelines, action may be taken against such bidders/supplier/contractor as per extant "Guidelines for Suspension of Business Dealings with Suppliers/Contractors". Abridged version of same is available at BHEL website (www.bhel.com) on "Supplier Registration" Page.
33.	REVERSE AUCTION : BHEL reserve the right to go for Reverse Auction (RA) instead of opening the sealed envelope price bid, submitted by the bidder or price bid submitted by the bidder through e-procurement system. This will be decided after techno-commercial evaluation. All bidders to give their acceptance for participation in RA. Non-acceptance to participate in RA may result in non-consideration of their bids, in case BHEL decides to go for RA. In case BHEL decides to go for Reverse Auction, only those bidders who have given their unconditional acceptance to participate in RA will be allowed to participate in the Reverse Auction. Those bidders who have given their acceptance to participate in Reverse Auction will have to necessarily submit "online sealed bid" in the Reverse Auction. Non-submission of "online sealed bid" by the bidder will be

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	considered as tampering of the tender process and will invite action by BHEL as per extant guidelines in vogue. General Terms and Conditions of RA are available at Annexure. Business Rules for RA shall be sent to the bidders before conducting RA. Abridged Version of "Common Guidelines for Conducting Reverse Auction" may also be seen at BHEL website (www.bhel.com) on "Supplier Registration" Page & "Tender Notifications" Page.
34.	INTEGRITY PACT : NOT APPLICABLE Bidders shall have to enter into Integrity Pact with BHEL, duly signed with seal in original, if specified in NIT / RFQ failing which bidder's offer shall be liable for rejection.
35.	TERMINATION OF CONTRACT : BHEL shall have the right to cancel the Purchase Order / Contract without any financial implication to BHEL if vendor approval by end user / customer is withdrawn or in case of Suspension of Business Dealings with the Suppliers / Contractors by BHEL. BHEL shall have the right to cancel Purchase Order / Contract, wholly or in part, in case they are obliged to do so on account of any decline, diminution, curtailment or stoppage of their business and in that event, the Supplier's / Contractor' compensation claim shall be settled mutually. In case of cancellation of Purchase Order / Contract for main supply, all other associated Purchase Orders / Contracts like those for Mandatory Spares / Recommended Spares / Erection, Testing & Commissioning (ETC) / Supervision of ETC, if any, would also get cancelled.
36.	SHELF LIFE : NOT APPLICABLE Supplier has to inform the list of the items / sub-items which have limited shelf life like consumables or those required for the first fill and shall indicate the corresponding shelf life period in the offer. Such items / sub-items shall be manufactured / despatched only after getting formal clearance from BHEL.
37.	LIMITATION OF LIABILITY : Notwithstanding any other provisions, except in cases of wilful misconduct and / or criminal negligence / acts, a) Neither the Supplier / Contractor nor BHEL shall be liable to the other, whether in Purchase Order / Contract, tort, or otherwise, for any consequential loss or damage, loss of use, loss of production or loss of profits or interest costs, provided however that this exclusion shall not apply to any obligation of the Supplier / Contractor to pay Liquidated Damages to the BHEL and b) Notwithstanding any other provisions incorporated elsewhere in the contract, the aggregate liability of the Contractor in respect of this contract, whether under the Contract, in tort or otherwise, shall not exceed total Contract Price, provided however that this limitation shall not apply to any obligation of the Vendor to indemnify BHEL with respect to Patent Infringement or Intellectual Property Rights.
38.	SHORTAGES / DAMAGES : a) Against Supply only or Supply where Supervision of Erection, Testing & Commissioning (ETC) at Site or Supply where Testing & Commissioning at Site is in scope of the supplier : Any shortages and / or damages in supplies shall be supplied / replenished free of cost by the supplier as early as possible but not later than 30 days from the date of intimation by BHEL to the supplier.

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	b) Against Supply where Erection, Testing & Commissioning (ETC) at Site is in scope of the supplier : Any shortages and / or damages in supplies and during handling / storage, erection, testing and commissioning at site shall be supplied / replenished free of cost by the Supplier / Contractor, as early as possible, to meet the contractual completion time / schedule. Note: There shall not be any extension in the contractual delivery time / schedule due to any shortages and / or damages in supplies.
39.	VARIATION OF CONTRACT VALUE / QUANTITY VARIATION : BHEL shall have the right to variation in quantities of items within $\pm 30\%$ of the total Purchase Order / Contract value at the time of placement of PO or award of Contract on overall basis for all amendments together within two years from the date of original Purchase Order / Contract or completion of execution of the Purchase Order / Contract whichever is earlier but quantities of individual items may vary to any extent or may get deleted unless otherwise specified in the technical specifications. No compensation is payable due to variation in the quantities and the Supplier / Contractor shall be bound to accept the same the contracted prices / rates without any escalation. However, if the Purchase Order / Contract is on "Lumpsum" basis, no variation of Purchase Order / Contract value shall be admissible to the Supplier / Contractor within the scope of Purchase Order / Contract, as long as the inputs remain unchanged.
40.	STATUTORY VARIATION : GST rates prevailing at the time of dispatch of goods/ completion of services shall be payable by BHEL. All other taxes, duties, charges, royalty, cess, other levies shall be deemed to be included in the Ex Works Prices / Charges quoted by bidders and no variations shall be payable in respect thereof . No other variations such as on customs duty, exchange rate, minimum wages, prices of controlled commodities, any other input etc. shall be payable by the BHEL. Notwithstanding anything above, where the actual completion of the supply / services occurs beyond the period stipulated in the Purchase Order / Contract or any extension thereof, variations referred to above, will be limited to the rates prevailing on the dates of such agreed completion periods only. For variations after the agreed completion periods, the Supplier / Contractor alone shall bear the impact for the upward revisions and for downward revisions BHEL shall be given the benefit of reduction in applicable taxes / GST. This will be without prejudice to the levy of liquidated damages for delay in delivery / completion. If new tax is introduced by Central/ State Govt/ Municipality becomes directly applicable on items specified in Bill of Quantities/Purchase Order/Contract, full reimbursements shall be made provided it becomes applicable on items specified in Bill of Quantities. However, any additional tax implication due to delay in delivery, beyond the Contractual Delivery, attributable to supplier shall be borne by supplier.
41.	MODE OF PAYMENT : Payment shall be made directly to the Supplier / Contractor by BHEL through NEFT / RTGS.
42.	CONFIDENTIALITY : Supplier / Contractor shall, at all times, undertake to maintain complete confidentiality of all data, information, software, drawings & documents etc. belonging to BHEL and also of systems, procedures, reports, input documents, manuals, results and any other BHEL documents discussed and / or finalized during the course of execution of Purchase Order / Contract.

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43.	INDEMNIFICATION : The Supplier / Contractor shall indemnify and keep indemnified and hold harmless BHEL and its employees and officers from and against any and all claims, suits, actions or administrative proceedings, demands, losses, damages, costs and expenses and any other claim of whatsoever nature in respect of the death or injury of any person or loss of or damage to any property arising during the course and out of the execution of the Purchase Order / Contract.
44.	TITLE OF GOODS : a) Ownership of the equipment / material procured in India, shall be transferred to BHEL upon loading on to the mode of transport to be used for transportation of the said equipment / material from the works to the site / destination and upon endorsement of the dispatch documents in favour of BHEL. b) Ownership of the equipment / material to be imported into the country where the site is located, if not procured in India, shall be transferred to BHEL upon loading on the mode of transport to be used for transportation of the equipment / material from the country of origin to that country / destination and upon endorsement of despatch document in favour of BHEL. c) Notwithstanding the transfer of ownership of the equipment / material, the responsibility for care and safe custody thereof together with the risk of loss or damage thereto for whatsoever reason shall remain with the Supplier.
45.	COMPLIANCE OF STATUTORY REQUIREMENTS : The vendor shall comply with all State and Central Laws / Acts, Statutory Rules, Regulations etc., as may be enacted by the Government during the tenure of the Purchase Order / Contract and having in force and applicable to the Purchase Order / Contract and nothing shall be done by the Supplier / Contractor in contravention of any Law / Act and / or Rules / Regulations, thereunder or any amendment thereof. The Supplier / Contractor shall pay all taxes, fees, licence charges / deposits, duties, tolls, royalty, commissions or other charges which may be levied on account of any of his operations connected with the Purchase Order / Contract. In case BHEL is constrained to make any of such payments, BHEL shall recover the same from the Supplier / Contractor either from moneys due to him or otherwise as deemed fit.
46.	ACCEPTANCE OF ORDER : Supplier should acknowledge and accept the Letter of Award / Purchase Order issued by BHEL within 7 days of the issue of Letter of Award / Purchase Order. In case of any discrepancy / typographical error in issue of Purchase Order / Contract, the agreed terms & conditions, scope of work, rates / prices for placement of PO / award of contract shall be applicable and BHEL reserves the right to issue amendment(s) to PO / Contract for correction of discrepancies / typographical errors in the PO / Contract at a later date.
47.	FRAUD PREVENTION POLICY : The Bidder along with its associate / collaborators / sub-contractors / sub-vendors / consultants / service providers shall strictly adhere to BHEL Fraud Prevention Policy displayed on BHEL website http://www.bhel.com and shall immediately bring to the notice of BHEL Management about any fraud or suspected fraud as soon as it comes to their notice.

Signature of Bidder (Authorized Signatory) with Date & Seal

**BHARAT HEAVY ELECTRICALS LTD.
(TRANSMISSION BUSINESS GROUP)**

ADDITIONAL GENERAL TERMS AND CONDITIONS

**FOR
TENDER ENQUIRY / CONTRACT
FOR
ERECTION, TESTING & COMMISSIONING (ETC) AT SITE**

This is to be read in conjunction with General Terms and Conditions for Tender Enquiry / Contract "BHEL/TBG/GTC/2016" & submitted duly signed by bidder in original. Clause-wise deviations and / or additional conditions / clarifications, if any, are to be brought out clearly in "Schedule of Commercial Deviation". Deviations and / or additional conditions / clarifications, if any, mentioned elsewhere in the bid / offer, shall not be considered.

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1.	SCOPE OF WORK : The scope of work of the successful bidder / contractor shall comprise but not limited to the following :- 1.1 Receipt of equipment / material at site, unloading, handling, transportation to storage area & storage at site. 1.2 Inspection / verification of equipment / material received for any shortage / damage after opening the packing / cases and intimating the same to BHEL / Owner and underwriters within the time period specified by BHEL / Underwriters and to strictly follow the procedures specified. Storage of equipment in open / indoor store to be provided by BHEL in line with the instructions of BHEL. 1.3 Conservation / maintenance / up-keeping of the equipment / item in the store. 1.4 Temporary lighting in stores and construction area wherever required for their work. 1.5 Safety / Security of equipment / material. 1.6 Transportation of equipment / material from store to erection site, erection of equipment / material in line with the drawings / instructions to be furnished by BHEL, testing, commissioning including PG test (if applicable) and handing over. 1.7 Maintenance of associated equipment till handing over & any other activity necessary for completion of the job but not specifically mentioned in this specification. 1.8 Unloading, transportation to storage area, storing, up-keeping and handing over of spare items / equipment. 1.9 Safety, watch & ward of material at site which shall be sole responsibility of the Contractor. Note : In case unloading / watch & ward of material at site is not executed by the Contractor, BHEL reserve the right to get it executed with the available resources at the risk & cost of the Contractor.

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2.	PRICES : Prices shall be FRIM for the total contract period and no price variation shall be applicable. Prices shall be inclusive of all taxes and duties, except GST. GST shall be payable extra only if quoted separately.
3.	TESTING AND COMMISSIONING : 2.1 All the electrical / mechanical test of the equipment & material and shall be arranged by the contractor as per standard specification / Field Quality Plan / Erection Manual / Directives of the Site Official / Owner. The contractor shall fill the check list for storage, erection, testing and commissioning of all their equipment as per BHEL systems to ensure proper quality of work. 2.2 All the testing equipment required to carry out the site test for all their equipment or the erected equipment shall be arranged by the contractor at his own cost. However, necessary instructions and guidelines will be given by BHEL / Owner. 2.3 The contractor shall be entirely responsible for the satisfactory erection and providing test equipment & skilled manpower for testing & commissioning of all equipment. 2.4 Before charging, the system shall have to be approved by Statutory Govt. Authorities like Electrical Inspector other concerned agency and the contractor has to arrange approval for the same.
4.	CONSUMABLES : The contractor shall maintain adequate inventory of necessary consumables at site prior to erection so that timely completion of the works under the contract is not held-up due to non-availability of consumables / spares.
5.	COMMENCEMENT OF WORK : Start / Zero date for the work shall be date of Contract / letter of intent or as specified in the Contract / activity schedule.
6.	COMPLETION SCHEDULE : The entire work under this tender enquiry is required to be completed as specified in NIT / Tender Enquiry.
7.	OVER RUN CHARGES : No over run charges are payable.
8.	IDLE LABOUR CHARGES : No idle labour charges will be admissible in the event of any stoppage of work resulting in the contractor's workmen being rendered idle due to any reason at any time.
9.	SECURITY-CUM-PERFORMANCE BANK GUARANTEE : The Contractor shall arrange to submit Security-cum-Performance BG for 10% of total Contract value for ETC at Site excluding taxes & duties along with first invoice or within 60 days from award of Contract whichever is earlier valid till guarantee period on a non-judicial stamp paper of appropriate value. • The Bank Guarantee shall be from any bank as per Annexure for List of Banks (32 Nos.). The original BG should be sent by issuing Bank directly to BHEL/TBG Sector Head, unless otherwise specified in the NIT. • Extension of validity of the BG in original, as per above clause, should be sent by issuing Bank directly to BHEL/TBG Sector Head, unless otherwise specified in the NIT, at least 45 days before expiry of validity of the BG. • Unless otherwise specified in the NIT, deviation taken for non-submission of BG, as applicable, shall not be accepted. • In case of non-submission BG / Deposit, as applicable, BHEL reserve the right for Risk Purchase as per terms of the NIT and impose Suspension of Business

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	Dealings with the Supplier / Contractor. - BHEL reserves the right to encash the Bank Guarantee and forfeit the amount in the event of any default, failure or neglect on part of the Contractor in fulfilment of performance of the Contract. - Value of the Bank Guarantee (at the time of submission) shall remain unchanged for any subsequent variations in Contract value up to $\pm 20\%$. Beyond this variation of $\pm 20\%$, the Contractor shall arrange to enhance or may reduce the value of the Bank Guarantee accordingly.
10.	INSURANCE : The Contractor shall take insurance to cover his Tools and Plants, assets, workmen's compensation and third party liabilities. The contractor shall make available the original insurance certificates to the Site Official for necessary verification before commencement of work.
11.	VARIATION OF CONTRACT VALUE / QUANTITY VARIATION : BHEL shall have the right to variation in quantities of items within $\pm 30\%$ of the total Contract value at the time of award of Contract on overall basis for all amendments together within two years from the date of original Contract or completion of execution of the Contract whichever is earlier but quantities of individual items may vary to any extent or may get deleted unless otherwise specified in the technical specifications. No compensation is payable due to variation in the quantities and the Contractor shall be bound to accept the same the contracted prices / rates without any escalation. However, if the Contract is on "Lumpsum" basis, no variation of Contract value shall be admissible to the Contractor within the scope of Contract, as long as the inputs remain unchanged.
12.	GUARANTEE : The equipment / material supplied and services rendered (if applicable) shall be guaranteed to be free from all defects and faults in design & engineering, material, workmanship & manufacture and in full conformity with the Contract, Technical Specifications & approved drawings / data sheets, if any, for 18 months from the date of last delivery or 12 months from the date of commissioning, whichever is later. The defective equipment / material / component shall be replaced free of cost at site. Any expenditure for dismantling and re-erection of the replaced equipment / material / component shall be to supplier's / contractor's account. All replacements during the guarantee period shall be delivered at site promptly and satisfactorily within a period not more than 45 days from the date of reporting the defect / rejection etc. In the event of the contractor failing to replace the defective equipment / material / component within the time period mentioned above, BHEL may proceed to undertake the replacement of such defective equipment / material / component at the risk and cost of the contractor without prejudice to any other rights under the contract and recover the same from BG / other dues of this Contract or any other Purchase Order / Contract executed by the contractor. Note : - In case of Illumination System, items viz. Lamps, Tubes, Ballast, Starters, and Capacitors & Fuses will not be under Guarantee after commissioning. - In addition to the above guarantee period, Extended Guarantee / Warranty, if any, shall be as per NIT / Technical Specifications. - In case offer of agent of Foreign OEM / Foreign Principal is considered, Guarantee as mentioned above has to be provided by the Foreign OEM / Foreign Principal also.

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13.	TERMS OF PAYMENT : For Erection, Testing & Commissioning (ETC) at Site 70% of the Contract value against monthly progressive bills on pro-rata basis for unloading, storage and completion of erection as certified by BHEL Site Official with 60 days from the date of receipt of GST Compliant Tax Invoice (Original +2 Copies) 20% of the Contract value against monthly progressive bills on pro-rata basis for testing & successful commissioning as certified by BHEL Site Official within 60 days from the date of receipt of GST Compliant Tax invoice in 3 sets (original + 2 copies) 10% of the Contract value after Acceptance Test, Re-test (if any), PG Test (if any) and Handing Over as certified by BHEL Site Official within 60 days from the date of receipt of GST Compliant Tax invoice in 3 sets (original + 2 copies) Note: - It should be ensured that Tax Invoice complies with statutory requirements under GST law to enable BHEL to avail Input Tax Credit. - Payment of GST component shall be made only if vendor has deposited the Tax and credit for the same is reflected in GSTN (GST Network) - Copy of GST Registration Certificate(s) shall be also be attached with Tax Invoice.
14.	PRICE VARIATION / ESCALATION : Prices shall be firm for total contract period and extended period, if any, and no price escalation / price variation will be applicable.
15.	LIQUIDATED DAMAGES FOR DELAY IN ERECTION, TESTING & COMMISSIONING (ETC) AT SITE: In case of delay in execution of Contract beyond the contractual completion time for Erection, Testing & Commissioning at Site, an amount of 0.5% of the total Contract value for ETC at Site per week of delay or part thereof subject to a maximum of 10% of the total Contract value for ETC at Site shall be deducted as Liquidated Damages (LD) along with applicable GST (if any) on LD. However, in case of staggered (lot-wise) contractual completion schedule, an amount of 0.5% of the total Contract value for ETC at Site of delayed lot per week of delay or part thereof shall be deducted as liquidated damages , subject to maximum of 10% of the total Contract value for ETC at Site along with applicable GST(if any) on LD. Note : - In case of any amendment / revision, the LD shall be linked to the amended / revised Contract value and completion time / schedule for ETC at Site, if applicable. - If, as per contractor, delay is not attributable to the contractor, delay analysis with documentary evidence may be submitted by the contractor at the earliest but not later than six months from the end of the financial year in which the payment is withheld. Based on the above details / documents submitted by the contractor, BHEL shall take final decision and if considered appropriate by BHEL, withheld amount (full or part as the case may be) shall be released, otherwise, full or balance withheld amount shall be treated as deduction of Liquidated Damages (LD) towards delay in Erection, Testing & Commissioning at Site..
16.	FACILITIES TO BE PROVIDED AT SITE BY THE CONTRACTOR : Watch and ward for the store and safe custody of the equipment / material in the scope of Contractor shall be his responsibility. It is the responsibility of the contractor to dismantle and take away all the material of

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	his office accommodation as soon as the work is handed over to BHEL / Owner and clean the area of debris.
17.	ADDITIONAL EXPENDITURE : In case any additional expenditure is incurred in the works arising out of the faulty execution of the works by the contractor, such additional expenditure shall be borne by the contractor.
18.	REGULATION OF LOCAL AUTHORITIES & COMPLIANCE OF STATUTORY REQUIREMENTS : The contractor shall give to the local Governing Body, Police and other concerned Authorities all such notice as may be required under law. The contractor, as required, will obtain independent licence under The Contract Labour (Regulation and Abolition) Act, 1970 from the concerned authorities based on the certificate (Form-V) issued by the Principal Employer / Customer. In case Contractor is not registered with GST authorities of state where project is located , vendor shall have to obtain registration with GST Authorities of state .The vendor shall comply with all State and Central Laws / Acts, Statutory Rules, Regulations etc., as may be enacted by the Government during the tenure of the Contract and having in force and applicable to the Contract and nothing shall be done by the Contractor in contravention of any Law / Act and / or Rules / Regulations, thereunder or any amendment thereof. Provisions of The Building & Other Construction Workers (Regulation of Employment and Conditions of Service) Act, 1996 and The Building & Other Construction Workers Welfare Cess Act, 1996 shall also be applicable. The Contractor shall pay all taxes, fees, licence charges / deposits, duties, tolls, royalty, commissions or other charges which may be levied on account of any of his operations connected with the Contract. In case BHEL is constrained to make any of such payments, BHEL shall recover the same from the Contractor either from moneys due to him or otherwise as deemed fit.
19.	DISCIPLINE OF WORKMEN : The contractor shall adhere to the disciplinary procedure set by the BHEL / owner in respect of his employees and workmen at site.
20.	ELECTRICITY & WATER : Electricity for ETC work shall be provided at one point on free of cost basis. The contractor shall have to make his own arrangements for distribution to various locations for their works including proper switches / fuse units, distribution boards, cables, poles etc. to ensure safety of employees, workmen and equipment. If required the contractor shall employ DG Set operated equipment in addition to electrically operated ones to ensure timely completion of work. Unless otherwise stated in NIT, the contractor shall make his own adequate arrangement for clear water to be used for various work.
21.	ARBITRATION : In the event of any dispute emanating from and relating to this contract, the matter shall be referred to the sole arbitration of the person appointed by the competent authority of BHEL. Subject to aforesaid, the provisions of "The Arbitration and Conciliation Act, 1996" and the rules made thereunder as amended from time to time in India shall apply to the arbitration proceedings. The venue of arbitration shall be in New Delhi. Further there shall be no claim for any pre-reference or pendente-lite interest on the claims and any claim for such interest made shall be void. However, in case of contract with Public Sector Enterprise / Undertaking (PSE/PSU) or Govt. Dept., the extant guidelines of Govt. of India shall be followed.

Signature of Bidder (Authorized Signatory) with Date & Seal



BHARAT HEAVY ELECTRICALS LIMITED

TRANSMISSION BUSINESS ENGINEERING MANAGEMENT

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BHEL Document No. TB-406-316-029				Rev. 00	Name	SB	VK	AG
Type of Document Technical Specification				Sign	 		31/11/19	
Title CCTV SYSTEM				Date	28.11.19	29.11.19	29.11.19	
				Group	TBEM			
				W.O. No	88009			
CUSTOMER				UPPTCL				
CONSULTANT				-				
PROJECT				400/220/132kV GIS Substation at Shamli (UP)				
CONTENTS								
SN	TITLE						No. of Pages	
1	Section – 1: Technical Specification						02	
2	Section – 2: Equipment Specification						07	
	○ Specification of CCTV System							
3	Section – 3: Project details & General Specification						54	
Rev No.	Date	Altered	Checked	Approved	REVISION DETAILS			
Distribution				To				
				Copies				

PROJECT: 400/220/132kV GIS Substation at Shamli (UP)	
CUSTOMER: UPPTCL.	
Technical Specification of CCTV System	TB-406-316-029
Section-1: Scope, Specific Technical Requirements & Quantities	REV.00

SECTION 1

SCOPE, SPECIFIC TECHNICAL REQUIREMENTS AND QUANTITIES

1.0 SCOPE

This technical specification covers the requirements of design, packing at works, supply, unloading at site, storage at site including safety & security of supplied materials, demonstration at site, erection/installation, testing and commissioning the complete CCTV system including cameras, digital video recorder system, mounting arrangement for cameras, cables, LAN switches, UPS and any other items/accessories for the 400/220/132kV GIS Substation at Shamli (U.P.). It shall also be bidder's responsibility to provide all necessary licenses to Owner i.e. UPPTCL to run the system successfully.

1.1 The equipment are required for the following project:

Name of Owner : UPPTCL.

Name of Project : 400/220/132kV GIS Substation at Shamli (UP)

Refer Section - 3 for Project Details and General Specifications.

1.2 TECHNICAL PARTICULARS

Refer Section-2 for specific technical requirement.

In case of any discrepancies between the requirements mentioned under Section-1/Section-2 and those specified in the Section-3, the specifications given under Section-1/Section-2 shall prevail and shall be treated as binding requirements.

1.3 QUANTITIES :

As per Annexure-BOQ enclosed herewith.

Note:-

- Any other item such as LAN switches, network switches, wall-mount racks, software, glands, MCBs, joystick, NVR, Hard Disk, Pipes, Junction boxes, SFP module, spy guard, glands, mounting stand, poles, patch cord etc. required for meeting the technical requirements if any shall have to be covered in the mentioned BOQ items.
- Tentative quantities are mentioned in Annexure-BOQ. The above quantities (BOQ) are as per preliminary design only. The detail design will be submitted by Vendor and subject to approval by Customer. The BOQ quantities which are finalised after approval has to be supplied. BHEL reserves the right for quantity variation due to any reason upto $\pm 30\%$ of total value during execution of contract.
- Make/Model offered is subject to UPPTCL approval. UPPTCL approval shall be considered as final. The Catalogue of the offered make/ Model shall be approved by BHEL/ UPPTCL
- Bidder shall provide valid calibration certificate, test certificate & warranty certificate for the quoted test equipment in the event of order.
- UPPTCL may call for demonstration of the offered CCTV system, to ensure satisfactory performance before accepting the equipment. The same shall be without any price implication.

6. The Bidder shall be responsible for the design and verification of the CCTV system at site.
7. After placement of order, the bidder has to design the system as per relevant standards/codes, practice to the satisfaction of BHEL/ ultimate Customer i.e. UPPTCL.
8. The scope of work shall cover erection of the complete system, storage of equipment during erection and also minor civil works like excavation for laying of cables in HDPE conduit in ground/ walls etc as per requirement associated with the completion of the commissioning of the CCTV system.
9. The successful bidder shall submit a FAT (factory acceptance test) & SAT (site acceptance test) plan complying the specification for UPPTCL/ BHEL approval that will be used during inspection at works & and site respectively.
 - a. Complete operating and maintenance manuals and demonstration to O&M personnel.
 - b. System commissioning and acceptance tests as specified in site acceptance test (SAT) plan.
10. Earthing: 40MM Dia MS Rod/ 75 X 12, 50 X 6 Galvanized MS Flat will be free issue supplied by BHEL. The requirement shall be intimated by the Supplier after placement of order. However, any other special material required shall be in vendor scope. Also installation of all earthing material will be in vendor scope.
11. Any other items/ enclosures/ boxes required for protection of supplied cameras/ cable/ connectors for protection from weather shall be in vendor scope.
12. HDPE conduit should be used for routing the Lan cables/ FO Cables and any other cable as per specification.

1.4 BIDDER SHALL SUBMIT THE FOLLOWING DOCUMENTS ALONGWITH OFFER

- a) Make and model of each item.
- b) Technical datasheet/Catalogues/brochures of the item.
- c) Test certificates including valid type test reports as per relevant standards.
- d) Reference list of the Projects where similar equipment for similar application is being used for at least 2 years.
- e) Instruction Manual
- f) List of accessories offered
- g) Compliance of Technical Specification as per Annexure A to Section-1

1.5 CERTIFICATES/ REPORTS

Bidder shall submit valid test reports/ certificates as per relevant standard for review and approval by UPPTCL/BHEL.

1.6 TECHNICAL REQUIRMENT

Bidder shall have supplied and successfully installed and executed at least 2 nos CCTV system in last 2 years.

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BOQ for 400/220/132kV GIS Substation at Shamli (U.P.)			
Sr No	Description	Unit	Qty
1	Supply - PTZ Dome Camera of BOSCH make / Sony make / Any equivalent make (36X extended Zoom), 12X Digital Zoom as per detailed technical specification	Nos	3
2	Supply - Static (Bullet) Cameras of BOSCH make/ Sony make / Any equivalent make as per detailed technical specification	Nos	13
3	Supply - 16 channel DVR of BOSCH make / Sony make / Any equivalent make as per detailed technical specification	Set	1
4	Supply - POWER SUPPLY for item no. 1 & 2	Set	16
5	Supply - 32" LED TV Sony make (Model No. 32R402) as per detailed technical specification.	Nos	2
6	Supply - 3 core 1.5 Sq. mm. copper power cable of Finolex / Standard make as per IS	m	2000
7	Supply - Computer table as per the specification of Godrej / Methodex / Standard Make.	Set	1
8	Supply - 2 KVA online UPS with isolation transformer suitable for single phase AC input & single phase AC output, Floor Mounted Type with 60 min backup	Set	1
9	Supply - FO Cable 6 core	m	2500
10	Supply - CAT-6 cable for connecting PTZ cameras to DVR as per specification. (only D-link make)	m	1000
11	Supply - 40MM HDPE pipe	m	3000
12	Supply - Earthing of camera / DVR as per specification	Set	17

ANNEXURE-A:

DEVIATION/ CHANGE REQUEST OF TECHNICAL SPECIFICATION

Bidder shall list out all technical potential deviation/ change request (s) along with clause with respect to technical specifications.

Sl. No.	Page No.	Clause No.	Deviation	Reason / Justification
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Any deviation not specifically brought out in this section shall not be admissible for any commercial implication at later stage. Except to the technical deviations listed in this schedule, bidder's offer shall be considered in full compliance to the tender specifications irrespective of any such deviation indicated / taken elsewhere in the submitted offer.

Date:

Bidder's Stamp & Signature

Section-2 (CCTV SPECIFICATION)

This technical specification covers the requirements of design, packing at works, supply, unloading at site, storage at site including safety & security of supplied materials, demonstration at site, erection/installation, testing and commissioning and successful handing over the complete CCTV system including cameras, digital video recorder system, mounting arrangement for cameras, cables, LAN switches, UPS and any other items/accessories for the 400/220/132kV GIS Substation at Shamli (U.P.). It shall also be bidder's responsibility to provide all necessary licenses to Owner i.e. UPPTCL to run the system successfully.

Storage space at site shall be provided by BHEL.

The Contract shall be on Bill of Quantity basis for the package. In case of change in scope after award of the contract, the additions/ deletions to the scope shall be as per the breakup unit rates for all the equipment and services furnished by the bidder in his offer.

The Bidder shall be responsible for the design and verification of the CCTV system at site.

After placement of order, the bidder has to design the system as per relevant standards/codes, practice to the satisfaction of BHEL/ ultimate Customer i.e. UPPTCL.

Bidder shall submit the detailed BOQ and drawings indicating qty. of each items required for CCTV system in the detailed engineering stage, the drawings and BOQ shall be submitted to BHEL/UPPTCL for approval. It shall be bidder's responsibility to get the approval in the drawing/BOQ from UPPTCL. Bidder shall also be required to visit BHEL/ UPPTCL office for technical discussion.

General

The Contractor shall provide a closed circuit television system, which shall include the following:

- Two screen monitoring in Control Point;
- Fixed cameras in designated areas;
- Fully remotely controlled cameras, with zoom, tilt and pan controls, in designated areas;
- Automatic pan of remotely controlled cameras;
- Automatic monitor screen switching between cameras;
- Continuous elapsed time recording of the cameras as they are switched to the monitor;
- Real time recording of a multiplexed cameras on hard disk;
- Operator enabled motion detectors on all cameras irrespective of whether they are switched to the monitor screen;
- Hard disk playback facilities for at least 1 month of continuous recording;
- Hard disk full alarms;
- Supply of DVD burning facility to record video on DVD, (1) month of continuous recording; and
- Video signal shall be sent to SLDC (Lucknow) through tele-communication equipments.

- All CCTV equipment shall be of industrial quality (no domestic-type equipment is acceptable) and shall be of a type which has been specifically designed and manufactured for use in 100% duty cycle surveillance systems.

Technical Standards

- The complete television system shall be based on Phased alternate Line (PAL) 625 line techniques as used for colour TV studio, broadcast and receiver systems and in accordance with CCITT recommendations.
- All cameras shall incorporate automatic white balance.
- The cameras shall operate from a common time base or approved alternative system, to ensure synchronization of all cameras.
- The video cameras shall be fitted with adequately sized lenses and automatic exposure controls to allow operation in light levels of 4 lux to 400 lux.
- The cameras shall be protected against damage due to exposure to high intensity light sources.
- Cameras which are installed in open areas shall be weather and dust proofed to IP55. This standard shall extend to all remote control mechanisms.
- Internal fixed and remotely controlled cameras shall be protected against dust and moisture to IP53.
- All camera lenses shall be protected by a removable ultra-violet filter.
- Remotely zoomed cameras shall maintain focus at all angles of operation.
- Fixed cameras shall be fitted with limited zoom facilities to permit minor manual adjustment of the angle of surveillance cover.
- The fixed cameras shall be fitted with limited zoom facilities to permit minor manual adjustment of the angle of surveillance cover.
- The fixed camera mounting shall permit limited manual adjustment in the vertical and horizontal planes.
- Remotely controlled cameras shall be capable of being placed into automatic scan of programmed areas which are under surveillance. The motion detectors shall be inoperative during automatic scanning.

Camera Mountings

- All fixed cameras shall be securely mounted in position, and shall be equipped with secure posers and video plugs and sockets to facilitate maintenance and/or replacement.
- Remotely controlled cameras in outside areas shall be capable of being panned over 360°. Tilting of the camera shall be restricted to the areas which are to be monitored and shall generally be limited in vertical travel to avoid lighting and direct sunshine.

Location of Cameras

The tentative location of the cameras have been shown in Annexure A to Section-2. Bidders are requested to review the same and position the same and tentative drawings regarding coverage and other schematics to be shared along with the bid.

The successful bidder shall provide areas wise breakup as follows:

- 400 KV GIS
- 220 KV GIS
- 132 KV GIS
- Switchyard
- DG room
- Main Gate

The design shall also include the following:

- The angle of cover and extend of the surveillance area for fixed cameras
- The extend of the camera surveillance area provided by remotely controlled cameras at maximum zoom and wide-angle operation.

Cameras shall be installed so as to avoid operation directly into ceiling or wall mounted luminaries. The provisional location of the cameras has been shown in the drawing enclosed.

Surveillance Monitoring Facilities

CCTV Control Desk

- The CCTV control panel shall be mounted on a separate CCTV control desk in the Control Centre room.
- Two (2) colour monitors of minimum diagonal measurement of 450 mm shall be mounted at the rear of the CCTV control desk or on the wall immediately above the desk.
- The monitor screens shall be clearly visible from the main control desk operator's position and from the CCTV control desk.
- The lower portion of the CCTV control desk shall house recording and playback facilities and the storage of one month's supply of video recording cassettes.

Monitoring and Remote Control Facilities

One monitor "A", shall be operator selectable to any camera.

The second monitor, "B", shall be automatically switched between all cameras in sequence and shall display the video from each camera for a period of five (5) seconds to thirty seconds. The switching interval shall be operator controlled using a continuously variable, calibrated switch or by pushbutton in 5 second increments from 5 to 30.

The remotely controlled cameras shall each be fitted with a control panel for:

- Zoom
- Pan
- Focus correction (if required); and
- Automatic pan (on demand)

- The remote controls shall comprise mutually exclusive switches which shall operate the functions in either required direction. All control functions shall be monitored on monitor screen "A" without interference to the switched monitoring of screen "B".
- The remotely controlled cameras shall be capable of being placed in automatic pan mode during which the camera shall pan between preset limits and at a manually adjusted azimuth and focal length. During the automatic panning operation the motion detector shall be automatically disabled.

Motion Detection Alarm

Each camera shall be equipped with a motion detector on/off control. When activated the motion detector shall immediately raise a visual lamp alarm and an input to the overall DCS. The alarm shall be initiated if motion is detected during intervals in camera scanning where the video is not displayed on monitor screen "B".

When the motion detector alarm is enabled on any or all cameras, the initiation of a motion alarm shall cause the automatic switching of the alarm originating camera to monitor screen "A" and the activation of the associated video recorder in real time recording mode.

Video Recording

- The video input to monitor screen "B" shall be continuously switched between all cameras. The monitor screen "B" video shall be recorded in time lapse mode, ie every fifth frame of video.
- The video recorder shall insert on all frames, in the top right hand corner, the identification of the camera and the date and time (hour, minutes and seconds) in every 24 hour notation. The time and date shall be derived from the facility master clock.
- The detection of motion on any camera enabled in the alarm mode shall switch the video to monitor screen "A" and initiate real-time video recording if the camera output.
- During periods of real time recording of any camera video output the elapsed time recording of all camera outputs shall continue in sequence.
- In the event of a second motion detector alarm being initiated, the video shall be directed to monitor screen "B" and interrupt the sequential scanning of cameras and commence the real-time recording of the event. The second motion detector alarm may be restored to normal by cancellation of the alarm mode of the respective camera.

Video Recorders

The video recorders shall be professional digital DVD recording at high and extend play speeds and at every 5th frame and shall be redundant recorder.

Operational Protocol

The design of the CCTV system shall be directed towards the monitoring of the Control Centre. All cameras shall be recorded at the programmed intervals in time lapse, and the recording of this surveillance shall not be interrupted. Selected or alarm-initiated events shall be recorded as required in real time.

During normal operation and periods of high activity by operation and maintenance

personnel, monitoring shall proceed as follows:

- Monitor "A" to any camera;
- Monitor "B" to sequential scan of all cameras at programmed intervals;
- Recorder "A" – standby;
- Recorder "B" – recording screen "B", time-lapse of all cameras; and
- Motion alarms – inactive

At night and during periods of low activity by operation and maintenance personnel, monitoring shall proceed as follows:

- Motion detectors enabled on cameras in non-occupied areas;
- Monitor screen "B" and associated recorder continuous operation in time-lapse mode; and
- Motion detector alarm automatically switched alarm camera to video monitor and recorder "A" for real-time recording.

Brief Scope: Design, Supply, Erect, Test and Commission the complete system including cameras, Digital video recorder system, mounting arrangement for cameras, cables, LAN Switches, UPS and any other items/accessories required to complete the system. To provide all the necessary licenses to run the system successfully shall be in the scope of contractor.

Network Video Recorder

1	Server Spec	Intel Quad Core (or better) 3.0 Ghz (min.) , 8 MB Cache , 4 GB memory , with suitable NVIDIA graphics card, 3 TB HDD , Raid 5
2	Recording and Display Frame Rate	Real-time 25 frames per second per channel , manual select
3	Recording Resolution	(PAL): 1280X720 , 704(H) x 586(V) It should be possible to select lower resolutions
4	Compression Method	H.264/MPEG-4 or better and latest
5	Video Motion Detection Capable	Standard and built-in (selectable in menu)
6	Monitoring Options	Split screen 1, 2, 4 , 8, 16, 32 or more cameras
7	Playback Options	Search, still image capture
8	Alarm/Event Recording Capable	To be provided with built-in external alarm input/ output ports minimum(8 in, 2 out)
9	Network Operation Capable	To be provided by using WAN or LAN router
10	Remote Internet Viewing Capable	Using WAN or LAN router
11	HDD Storage Consumption	1GB ~ per hour / channel variable based on frame speed and resolution settings, as well as compression
12	Operation	Triplex operation (simultaneous recording, playback, network operation)
13	Number of Video	16

	Channel	
14	Audio Recording Capable	16
15	Input Voltage	230V AC or equivalent with UPS as a back up for 30 minutes.

Static Camera

1	Image Sensor	2-megapixel Progressive ,1 / 3" CMOS/CCD sensor, Minimum illumination 0.1 Lux
2	Min Luminous	0.5LUX(Color) 0.05Lux(Black)
3	Camera Enclosure Type	IP66 Grade
4	Iris/Focus	Auto/Manual
5	Video Compression	Dual Stream H.264 and MPEG 4 user selectable
6	Support Dual-stream	primary/secondary stream, H.264/MPEG 4 optional
7	Video Definition	Primary stream:1600x1200,1280x960,1280x720, Secondary stream:800x600,400x288,192x144
8	Video Parameters	Brightness, hue, contrast, saturation and image Quality
9	Video Frame Rate	PAL: 1-25frames/second NTSC:1-30frames/second
10	Video Compression BR	32Kbit/S - 6Mbit/S
11	Video Output	One channel composite Streaming
12	Supported Protocols	TCP, UDP, IP, HTTP, FTP, SMTP, DHCP, DNS,ARP, ICMP, POP3, NTP, IPsec, UpnP, RTP, RTCP
13	Operating Temperature	-5 ~ +50°C
14	Operating Humidity	10 ~ 90%

PTZ Dome Camera

1	Image sensor	1/3 type Solid State Progressive Scan CCD,WDR(High Definition)
2	Security	Multiple user access with password protection
3	Effective Pixels	(PAL): Main Stream: 1280 X 720 Sub Stream: 640X360, 320X280 selectable
4	Compression	Dual Stream H.264 and MPEG 4 user selectable
5	Signal System	50 Hz
6	S/N (signal to noise) Ratio	Better than 50 dB
7	Electronic Shutter	1/60 ~ 1/10,000 sec. automatic or better
8	Scanning System	Progressive/interlace
9	Low Light Sensitivity	Color: 0.5 Lux; B&W:0.02 Lux

	(lux)	
10	Lens	Minimum 10x (minimum) optical in High Definition (The system shall be able to zoom the images on the monitor without any distortion to the maximum level of optical zoom)
11	Lens Size	Minimum 4.1~73.8 mm
12	Lens Aperture	F1.6(wide)~F2.8(tele), f=4.1~41.0mm, 10X Zoom, Video Auto Focus Angle of View Horizontal : 52°(wide) , 2.8°(tele)
13	PTZ Data Transfer Baud/ Bit Rates Supported	Selectable 2400 bps / 4800 bps / 9600 bps
14	Panning Range	Complete 360 degrees (horizontal)
15	Pan Speed	Adjustable, 0.1 degrees / second ~ 250 degrees / second
16	Tilting Range	Minimum 180° Tilt Rotation
17	Tilt Speed	Adjustable, 0.1 degrees / second ~ 150 degrees / second
18	In Built Storage	Camera should have inbuilt storage TF or SD format for recording and storing Pictures
19	IP Class	IP66 Standard
20	Working temperature	-0°C ~ +50°C
21	Working Humidity	10 ~ 90%

GENERAL TECHNICAL REQUIREMENTS OF SPECIFICATIONS (GTR)

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GENERAL TECHNICAL REQUIREMENTS OF SPECIFICATIONS (GTR)

GENERAL

1.0

This section stipulates the General Technical Requirements (GTR) under the Contract and will form an integral part of the Technical Specification.

The provisions under this section are intended to supplement general requirements for the materials, equipments and services covered under respective equipment sections and are not exclusive. However in case of conflict between the requirement specified in this section and requirements specified under respective equipment sections, the requirements specified under respective sections shall hold good.

Every effort will be made to supply all equipment as per the technical details furnished in the specification. However, due to the standard manufacturing practice of various equipment suppliers and depending on the selected vendor, there may be slight variations from indicated values at the contract stage. Such variations should not affect the quality and performance of the equipment.

It is not the intent to specify completely in technical specifications of equipments/ materials all details of the design and construction of equipment. However, the equipment shall conform in all respects to high standards of engineering, design and workmanship and shall be capable of performing in continuous commercial operation. The Purchaser will interpret the meaning of drawing and specification and shall have the power to reject any work or material which in his judgement is not in accordance therewith. The equipment offered shall be complete with all components necessary for its effective and trouble free operation. Such components shall be deemed to be within the scope of Bidder's supply, irrespective of whether these are specifically brought out in this specification and/or commercial order or not.

COMPLETENESS OF EQUIPMENTS

2.0

Equipments furnished shall be complete in every respect with all mountings, fittings, fixtures and standard accessories specified &/or normally provided with such equipment and/ or needed for erection, completion and safe operation of the equipment as required by applicable codes though they may not have been specifically detailed in the Technical Specifications. Materials and components not specifically stated in the specification but which are necessary for commissioning and satisfactory operation of the substation unless specifically excluded shall be deemed to be included in the scope of the specification and shall be supplied without any extra cost. All similar standard components/ parts of similar standard equipment provided, shall be inter-changeable with one another.

2.1

The Bidder shall supply type tested (including special test as per technical specification) equipments and materials. The test reports/details shall be furnished by the Bidder in the bid. In the event of any discrepancy in the test reports i.e. any test report not acceptable due to any design/manufacturing changes or due to non-compliance with the requirement stipulated in the Technical Specification and/or IEC/ IS, same, shall be carried out without any additional cost implication to the Purchaser. The Purchaser reserves the right to get any or all type tests conducted/ repeated.

2.2

The reports for all type tests and additional type tests as per technical specification furnished by the Bidder shall be of the tests conducted within last D5(five) years prior to the date of bid opening. The type tests conducted should have either been conducted in accredited laboratory (accredited based on ISO/ IEC Guide 25/ 17025 or EN 45001 by the national accreditation body of the country where laboratory is located) or witnessed by UPTCL or representative authorized by UPTCL or Utility or representative of accredited test lab or reputed consultant.

3.0 STANDARDS

Except as modified by this Bid specification, all material and equipment shall conform to the requirement of the latest editions of relevant IS/ IEC and other applicable standards. The equipments/ works shall be designed, engineered, manufactured, built, tested and commissioned shall be carried out in accordance with the Acts, Rules, Laws and Regulations in force in India.

In addition to meeting the specific requirements called for in the respective sections of the Technical Specification, the equipment shall also conform to the general requirement of the relevant standards which shall form an integral part of the specification. When the specific requirements stipulated in the specifications exceed or differ than those required by the applicable standards, the stipulation of the specification shall take precedence.

In the event of the Bidder offering equipment conforming to standards other than IS/IEC standards, which ensure equivalent or better performance than that specified in the standards, the salient point of comparison between the standards adopted and relevant IS/ IEC standards shall be indicated clearly in the proposal, along with English language version of such standard or relevant extract of the same. The equipment conforming to standards other than IS/IEC shall be subject to Purchaser's approval.

The standards mentioned in the respective equipment specifications are not mutually exclusive or complete in themselves. The equipment &/or work shall also conform to any other applicable standard, even if not specifically mentioned in these specifications.

Should the Bidder wish to depart from the provisions of the specifications, either on accounts of manufacturing practices or for any other reason, he shall clearly mention the departure and submit complete justification supported by information, drawings etc. as will enable to assess the suitability of equipment(s) offered. In the event of the Bidder's specifications, drawings, forms and tables etc. being found to disagree with the requirement of the Bid specifications at any stage, Bid specifications shall be binding, unless the departures have been duly approved in writing by the Purchaser.

3.6 REFERENCE OF STANDARDS

Reference	Abbreviation	Name and Address
IEC/ CISPR	International Electro technical Commission	Bureau Central de la Commission, Electro Technique International, 1 Rue de verembe Geneva, Switzerland
IS	Indian Standards,	Bureau of Indian Standard, Manak Bhavan, 9, Bahadur Shah Zafar Marg, New Delhi-110 002, INDIA

BS	British Standards,	British Standards Institution, 101, Pentohnvilla Road, N-19-ND UK
ISD	International Organization For Standardization,	Danish Board of Standardization Danish Standardising Sraat, Aurehoevej-12, DK-2900, Heelprup, DENMARK
NEMA	National Electric Manufacture Associate	115, East 44th Street, New York NY 10017 U.S.A

4.0 PROJECT DATA

- i. Location
- ii. Altitude
- iii. Climatic Conditions
 - (a) Design maximum ambient Temperature Air 50°C
 - (b) Minimum ambient air temperature in shade 0°C
 - (c) Relative Humidity 100%Max.
 - (d) Wind Load 195 Kg./ Sq.m.
 - (e) Seismic Level 0.3 g
 - (f) Isoceraunic Level 50days/ year
 - (g) Average annual rain fall 1200 mm
 - (h) Hot and humid tropical Climate conducive to rust and fungus growth

5.0 SYSTEM PARTICULARS

- (i) Rated System voltage 420 kV, 245kV, 145kV, 36kV
- (ii) System frequency 50 Hz, This may vary by ± 5%
- (iii) Number of phases Three
- (iv) Neutral Effectively Earthed
- (v) Auxiliary power supply:-

Auxiliary electrical equipment shall be suitable for operation on the following supply system:

- (a) Power device (Like drive motors) 400V, 3Phase, 4Wire 50Hz Effectively earthed AC system.
- (b) Lighting fixtures, space heaters, fractional Horse Power motors and control devices. AC supply with one point grounded.
- (c) DC alarm, Control and Protective Devices from sub station batteries as under
 - (i) 400 kV 5/5 : 220V DC (ii) 220/132kV 5/5 : 110V DC (iii) Communication : 48 V DC equipment

The above supply voltage is subject to variation as follows:

All devices must be suitable for a continuous operation over the entire range of voltage variations:

- (i) AC Voltage may vary by $\pm 10\%$.
Frequency by $\pm 5\%$
Combined Voltage & frequency by $\pm 10\%$.
- (ii) DC
- a) 220 V may vary between 187 & 242 V
b) 110 V may vary between 93 & 121 V
c) 48 V may vary between 41 & 53 V

6.0 SYSTEM PARAMETERS

The following system parameters shall prevail:

Sl. No.	Description of Parameters	400 kV System	220 kV System	132 kV System	33 kV System
1.	Nominal system voltage	400kV	220kV	132kV	33kV
2.	Maximum operating voltage of the system(rms)	420kV	245kV	145kV	36kV
3.	Rated frequency	50Hz	50Hz	50Hz	50Hz
4.	No. of phase	3	3	3	3
5.	Rated short time current	50 kA for 3 Sec.	40 kA for 3 sec	31.5 kA for 3 sec	25 kA for 3 sec
6.	Dry and wet one minute power frequency withstand voltage	680 kV	460 kV	275 kV	95 kV
7.	Dry and wet impulse withstand voltage positive and negative	1550 kVp	1050 kVp	650 kVp	250 kVp
8.	Corona extinction voltage	320 kV	156 kV	105 kV	-
9.	Max. Radio interference voltage for frequency between 0.5 MHz and 2 MHz at 508 kV rms for 765kV, 320kV rms for 220kV system and 156kV rms for 400kV system & 92kV rms for 132kV system	1000 microvolt	1000 microvolt	500 microvolt	-
10.	Minimum total creepage	25mm/kV (10500 mm)	25mm/kV (6125 mm)	25mm/kV (3625 mm)	25mm/kV (1300 mm)
11.	Min. clearances				
i.	Phase to phase	4000mm (for Conductor-conductor)	2100 mm	1300 mm	320 mm
ii.	Phase to earth	4200mm (for rod - Conductor)	2100 mm	1300 mm	320 mm

12. iii) Sectional clearances
System neutral earthing
- | | | | |
|-----------------------------|-----------------------------|-----------------------------|-----------------------------|
| 6500 mm Effectively Earthed | 5000 mm Effectively Earthed | 4000 mm Effectively Earthed | 3000 mm Effectively Earthed |
|-----------------------------|-----------------------------|-----------------------------|-----------------------------|

Major technical parameters of bushings/ hollow column/ support insulators are given below:

Sl. No	Parameters	400 kV System	220 kV System	132 kV System	33 kV System
(a)	Max. System voltage Um (kV)	420	245	145	36
(b)	Impulse withstand voltage (dry & wet) (kVp)	± 1425	± 1050	± 650	± 170
(c)	Switching surge withstand voltage (dry & wet) (kVp)	1050	-	-	-
(d)	Power frequency withstand voltage (dry and wet) (kV rms)	650	460	275	75
(e)	Total creepage distance(min) (mm)	10500	6125	3625	900

Insulator shall also meet requirement of IEC- 815 for 420kV, 245kV, 145kV and 36kV systems, as applicable having alternate long and short sheds.

7.0 SERVICES TO BE PERFORMED BY THE EQUIPMENT

All equipments shall perform satisfactorily under various electrical, electromechanical and meteorological conditions of the installation site.

All equipment shall be able to withstand all external and internal mechanical thermal and electromechanical forces due to various factors like wind load temperature variation, ice & snow (wherever applicable) short circuit etc for the equipment.

The Bidder shall design the various forces which the terminal connectors of the equipment are required to withstand.

All outdoor EHV equipments except marshalling kiosks shall be suitable for hot line washing.

To facilitate erection of equipment, all items to be assembled at site shall be "match marked".

8.0 CLAMPS AND CONNECTORS INCLUDING TERMINAL CONNECTORS

8.1 Each equipment shall be supplied with necessary terminals and connectors as required by the design for the particular installation. The terminal connector shall be suitable for the conductor used for particular installation, which are as under as per UPPTCL's practice:

8.2 Where copper to aluminum connections are required, bimetallic clamps shall be used, which shall be properly designed to ensure that any deterioration of the connection is kept to a minimum and restricted to part which are not current carrying or subjected to stress. The design details of the joint shall be furnished to the Purchaser by the Bidder.

- 8.3** Low voltage connectors, grounding connectors and accessories for grounding all equipment are also included in the scope of work.
- 8.4** No current carrying part of any clamp shall be less than 10 mm thick. All ferrous parts shall be hot dip galvanized. Copper alloy liner of minimum 2 mm thickness shall be used with aluminum body for Bimetallic clamps.
- 8.5** All casting shall be free from blow holes, surface blisters cracks and cavities. Sharp edges and corners shall be blurred and rounded off.
- 8.6** Flexible connectors, braids or laminated straps made for the terminal clamps for bus posts shall be suitable for both expansion or through (fixed/sliding) type connection of 4" IPS AL tube as required. In both the cases the clamp height (top of the mounting pad to centre line of the tube) should be same.
- 8.7** The clamps/ connectors shall be designed to carry the same current as the conductor and the temperature rise shall be equal or less than that of the conductor at the specified ambient temperature. The rated current for which the clamp/ connector is designed with respect to specified reference ambient temperature, shall also be indelibly marked on each component of the clamp/connector, except on hardware.
- 8.8** All current carrying parts shall be designed and manufactured to have minimum contact resistant.
- 8.9** Clamps and connectors shall be designed to be corona controlled. Corona extinction voltage for 420kV, 220kV and 132kV class clamps shall not be less than 320, 156 and 105kV (rms) respectively and R.I.V level shall not be more than specified 1000, 1000 and 500 micro volts for 420kV, 220kV and 132kV system at the test voltage specified.
- 9.0** **SUPPORT STRUCTURES**
- 9.1** The base design of all the equipments, to be installed on auxiliary structures, shall conform to the standard auxiliary structure designs presently being used in UPPTCL at 400/220/132/33kV Substations.
- 9.2** All equipment support structures shall be supplied alongwith brackets, angles, stools etc. for attaching the operating mechanism, control cabinets and marshalling box (wherever applicable) etc.
- 9.3** The support structures should be hot dip galvanised with minimum 610 gram/sq.m net of zinc.
- 10.0** **COLOUR SCHEME AND CODES FOR PIPE SERVICE**
- The Bidder shall propose a colour scheme for the those equipments/ items for which the colour scheme has not been specified in the specification. For the approval of purchaser. The decision of Purchaser shall be final. The scheme shall include.
- Finishing colour of Indoor equipment.
- Finishing colour of Outdoor equipment.

Finish colour of all cubicles.

Finishing colour of various auxiliary system equipment including piping

Finishing colour of various building items.

All steel structures, plates etc. shall be painted with non-corrosive paint with a suitable primer. It may be noted that normally all electrical equipments in switchyard are painted with shade 631 of IS-5. The indoor cubicles, GIS enclosures and other miscellaneous items, the colour scheme shall be approved by the Purchaser during detailed engineering.

11.0 MATERIAL/ WORKMANSHIP

11.1 General Requirement

Where the specification does not contain references to workmanship, equipment, materials and components of the covered equipment, it is understood that the same must be new, of highest grade of the best quality of their kind, conforming to best engineering practice and suitable for the purpose for which they are intended.

The design of the works shall be such that installation, future expansions, replacements and general maintenance may be undertaken with a minimum of time and expenses. Each component shall be designed to be consistent with its duty and suitable factors of safety, subject to mutual agreements. All joints and fastenings shall be devised, constructed and documented so that the component parts shall be accurately positioned and restrained to fulfill their required function. In general screw threads shall be standard metric threads. The use of other thread forms will only be permitted when prior approval has been obtained from the Purchaser.

Whenever possible, all similar part of the Works shall be made to gauge and shall also be made interchangeable with similar parts. All spare parts shall also be interchangeable and shall be made of the same materials and workmanship as the corresponding parts of the Equipment supplied under the Specification. Where feasible, common component units shall be employed in different pieces of equipment in order to minimize spare parts stocking requirements. All equipment of the same type and rating shall be physically and electrically interchangeable.

All materials and equipment shall be installed in strict accordance with the manufacturer's recommendation(s). Only first-class work in accordance with the best modern practices will be accepted. Installation shall be considered as being the erection of equipment at its permanent location. This, unless otherwise specified, shall include unpacking, cleaning and lifting into position, grouting, leveling, aligning, coupling of or bolting down to previously installed equipment bases/foundations, performing the alignment check and final adjustment prior to initial operation, testing and commissioning in accordance with the manufacturer's tolerances, instructions and the Specification. All factory assembled rotating machinery shall be checked for alignment and adjustments made as necessary to re-establish the manufacturer's limits. Suitable guards shall be provided for the protection of personnel on all exposed rotating and/or moving machine parts and shall be designed for easy installation and removal for maintenance purposes. The spare equipment(s) shall be installed at designated locations and tested for healthiness.

The Bidder shall apply oil and grease of the proper specification to suit the machinery, as is

necessary for the installation of the equipment. Lubricants used for installation purposes shall be drained out and the system flushed through where necessary for applying the lubricant required for operation. The Bidder shall apply all operational lubricants to the equipment installed by him.

All oil, grease and other consumables used in the Works/ Equipment shall be purchased in India unless the Bidder has any special requirement for the specific application of a type of oil or grease not available in India. In such case he shall declare in the proposal, where such oil or grease is available. He shall help Purchaser in establishing equivalent Indian make and Indian Contractor. The same shall be applicable to other consumables too.

A cast iron or welded steel base plate shall be provided for all rotating equipment which are to be installed on a concrete base unless otherwise agreed to by the Purchaser. Each base plate shall support the unit and its drive assembly, shall be of design with pads for anchoring the units and shall have a raised up all around and shall have threaded in air connections, of so required.

11.2 PROVISIONS FOR EXPOSURE TO HOT AND HUMID CLIMATE

Outdoor equipment supplied under the specification shall be suitable for service and storage under tropical conditions of high temperature, high humidity, heavy rainfall and environment favourable to the growth of fungi and mildew. The indoor equipments located in non-air conditioned areas shall also be of same type.

12.0 SPACE HEATERS

The heaters shall be suitable for continuous operation at 240V AC supply. On-off switch and fuse shall be provided for the heater.

One or more adequately rated thermostatically connected heaters shall be supplied to prevent condensation in any compartment. The heaters shall be installed in the lower portion of the compartment and electrical connections shall be made sufficiently away from below the heaters to minimize deterioration of supply wire insulation. The heaters shall be suitable to maintain the compartment temperature to prevent condensation.

The heaters shall be suitably designed to prevent any contact between the heater wire and the air and shall consist of coiled resistance wire centered in a metal sheath and completely encased in a highly compacted powder of magnesium oxide or other material having equal heat conduction and electrical insulation properties, or they shall consist of resistance wire wound on a ceramic and completely covered with a ceramic material to prevent any contact between the wire and the air. Alternatively, they shall consist of a resistance wire mounted into a tubular ceramic body built into an envelope of stainless steel or the resistance wire is wound on a tubular ceramic body and embedded in glaze. The surface temperature of the heaters shall be restricted to a value which will not shorten the life of the heater sheaths or that of insulator wire or other component in the compartments.

13.0 FUNGI STATIC VARNISH

Besides the space heaters, special moisture and fungus resistant varnish shall be applied on parts which may be subjected or predisposed to the formation of fungi due to the presence or deposit of nutrient substances. The varnish shall not be applied to any surface of part where

the treatment will interface with the operation or performance of the equipment. Such surfaces or parts shall be protected against the application of the varnish.

14.0 VENTILATION OPENING

In order to ensure adequate ventilation, compartments shall have ventilation openings provided with fine wire mesh of brass to prevent the entry of insects and to reduce to a minimum the entry of dirt and dust. Outdoor compartment openings shall be provided with shutter type blinds and suitable provision shall be made so as to avoid any communication of air/ dust with any part in the enclosures of the Control Cabinets, Junction boxes and Marshalling Boxes, panels etc.

15.0 DEGREE OF PROTECTION

The enclosures of the Control Cabinets, junction boxes and Marshalling Boxes, panels etc. to be installed shall be provided with degree of protection as detailed here under:

- Installed out door : IP-55
- Installed indoor in air conditioned area : IP-31
- Installed in covered area : IP -52
- Installed indoor in non air-conditioned area where possibility of entry of water is limited: IP-41
- For LT Switchgear (AC & DC distribution Boards): IP-52

The degree of protection shall be in accordance with :13947 (Part-I)/ IEC-60947 (Part-I)/ IS 12063 / IEC-60529. Type test report for degree of protection test, on each type of the box shall be submitted for approval.

16.0 RATING PLATES, NAME PLATES AND LABELS

Each main and auxiliary item of substation is to have permanently attached to it in a conspicuous position a rating plate of non-corrosive material upon which is to be engraved manufacturer's name, year of manufacture, equipment name, type or serial number together with details of the loading conditions under which the item of substation in question has been designed to operate, and such diagram plates as may be required by the Purchaser. The rating plate of each equipment shall be according to IEC requirement.

All such nameplates, instructions plates, rating plates CB, CT, VT, SA, Isolators and Relay & Protection panels equipments shall be bilingual with Hindi inscription first followed by English. Alternatively two separate plates one with Hindi and the other with English inscriptions may be provided.

17.0 FIRST FILL OF CONSUMABLES, OIL AND LUBRICANTS

All the first fill of consumables such as oils, lubricants, filling compounds, touch up paints, soldering/brazing material for all copper piping of circuit breakers and essential chemicals etc. which will be required to put the equipment, covered under the scope of the specifications, into successful operation, shall be furnished by the Bidder unless specifically excluded under

	the exclusions in these specifications and documents.	
18.0	PACKAGING AND PROTECTION All the equipments shall be suitably protected, coated, covered or boxed and crated to prevent damage or deterioration during transit, handling and storage at site till the time of erection. The Bidder shall also submit packing details/associated drawing for any equipment/material, to facilitate the Purchaser to repack any equipment/material at a later date. The Bidder shall be responsible for any loss or damage during transportation, handling and storage due to improper packing. Any demurrage, wharfage and other such charges claimed by the transporters, railways etc. shall be to the account of the Bidder. All coated surfaces shall be protected against abrasion, impact, discolouration and any other damages. All exposed threaded portions shall be suitably protected with either a metallic or a non-metallic protection device. All ends of all valves and pipings and conduit equipment connections shall be properly sealed with suitable devices to protect them from damage. The parts which are likely to get rusted, due to exposure to weather should also be properly treated and protected in a suitable manner.	
	SURFACE FINISH All interiors and exteriors of tanks, control cubicles and other metal parts shall be thoroughly cleaned to remove all rust, scales, corrosion, greases or other adhering foreign matter. All steel surfaces in contact with insulating oil as far as accessible shall be painted with not less than two coats of heat resistant, oil insoluble, insulating paints. All metal surfaces exposed to atmosphere shall be given two primer coats of zinc chromate and two coats of epoxy paint with epoxy base thinner. All metal parts not accessible for painting shall be made of corrosion resisting material. All machine finished or bright surfaces shall be coated with a suitable preventive compound and suitably wrapped or otherwise protected. All paints shall be carefully selected to withstand tropical heat and extremes of weather within the limit specified. The paint shall not scale off or wrinkle or be removed by abrasion due to normal handling. All external painting shall be as per shade No. 631 of IS: 5.	
19.0	HOT DIP GALVANISING All ferrous parts including all sizes of nuts, bolts, plain and spring washers, support channels, structures, shall be hot dip galvanized conforming to latest version of IS: 2629 or any other equivalent authoritative standard. However, hardware less than M12 size shall be electro-galvanized. Minimum weight of zinc coating shall be 610 gm/ sq.mm and minimum thickness of coating shall be 85 microns for all items thicker than 6 mm. For items lower than 6mm thickness, requirement of coating shall be as per relevant ASTM. For surface which shall be embedded in concrete, the zinc coating shall be 610 gm/sq. m minimum. The galvanized surfaces shall have a continuous and uniform thick coating of zinc, firmly adhering to the surface of steel. The finished surface shall be clean and smooth and shall be free from defects like discoloured patches, bare spots, unevenness of coating, spelter which is loosely attached to the steel globules, spiky deposits, blistered surface, flaking or peeling off,	
	etc. The presence of any of these defects noticed on visual or microscopic inspection shall render the material liable to rejection.	
	After galvanizing, no drilling or welding shall be performed on the galvanized parts of the equipment excepting that nuts may be threaded after galvanizing. Sodium dichromate treatment shall be provided to avoid formation of white rust after hot dip galvanization.	
	Galvanised material must be transported properly to ensure that galvanised surfaces are not damaged during transit. Application of zinc rich paint at site shall not be allowed.	
21.0	PROTECTIVE GUARDS Suitable guards shall be provided for protection of personnel on all exposed rotation and/of moving machine parts. All such guards with necessary spares and accessories shall be designed for easy installation and removal for maintenance purpose.	
22.0	TODLS AND TACKLES The Bidder shall supply with the equipment one complete set of all special tools and tackles for the erection, assembly, dis-assembly and maintenance of the equipment. However, these tools and tackles shall be separately packed and brought on to site.	
23.0	CONTROL CABINETS, JUNCTION BOXES, TERMINAL BOXES AND MARSHALLING BOXES FOR OUTDOOR EQUIPMENT All types of boxes, cabinets etc. shall generally conform to and be tested in accordance with IS-5039/ IS-8623, IEC-60439, as applicable, and the clauses given below.	
23.1	Control cabinets, junction boxes, marshalling boxes and terminal boxes shall be made of sheet steel or aluminum enclosure and shall be dust, water and vermin proof. Sheet steel used shall be at least 2.0 mm thick cold rolled or 2.5 mm hot rolled. The box shall be properly braced to prevent wobbling. There shall be sufficient reinforcement to provide level surfaces, resistance to vibrations and rigidity during transportation and installation. In case of aluminum enclosed box, the thickness of aluminum shall be such that it provides adequate rigidity and long life as comparable with sheet steel of specified thickness.	
23.2	Cabinet/boxes shall be free standing floor mounting type, wall mounting type or pedestal mounting type as per requirements. A canopy and sealing arrangements for operating rods shall be provided in marshalling boxes/ Control cabinets to prevent ingress of rain water.	
23.3	Cabinet/boxes shall be provided with double hinged doors with padlocking arrangements. The distance between two hinges shall be adequate to ensure uniform sealing pressure against atmosphere. The quality of the gasket shall be such that it does not get damaged/cracked during the operation of the equipment.	
23.4	All doors, removable covers and plates shall be provided gasket all around with suitably profiled EPDM/Neoprene gaskets. The gasket shall be tested in accordance with approved quality plan, IS:11149 and IS:3400. The quality of gasket shall be such that it does not get damaged/cracked during 10(ten) years of operation of the equipment or its major overhaul whichever is earlier. All gasketed surfaces shall be smooth straight and reinforced if necessary to minimize distortion	
23.5		

and to make a tight seal. Ventilating Louvers, if provided, shall have screen and filters, the screen shall be fine wire mesh made of brass.

23.6 All boxes/ cabinets shall be designed for the entry of cables from bottom by means of weather proof and dust-proof connections. Boxes and cabinets shall be designed with generous clearances to avoid interference between the wiring entering from below and any terminal blocks or accessories mounted within the box or cabinet. Suitable cable gland plate projecting at least 150 mm above the base of the marshalling kiosk/box shall be provided for this purpose along with the proper blanking plates. Necessary number of cable glands shall be supplied and fitted on this gland plate. Gland plate shall have provision for some future glands to be provided later, if required.

23.7 A 240V, single phase, 50 Hz, 15 amp AC plug and socket shall be provided in the cabinet with ON-OFF switch for connection of hand lamps. Plug and socket shall be of industrial grade.

23.8 For illumination, a 20 Watts fluorescent tube or 15 watts CFL/LED bulb shall be provided. The switching of the fittings shall be controlled by the door switch.

For junction boxes of smaller sizes such as lighting junction box, manual operated earth switch mechanism box etc., plug socket, heater and illumination is not required to be provided.

23.9 All control switches shall be of rotary type. Toggle piano switches shall not be accepted.

23.10 Positive earthing of the cabinet shall be ensured by providing two separate earthing pads. The earth wire/ strip shall be terminated on to the earthing pad and secured by the use of self etching washer. Earthing of hinged door shall be done by using a separate earth wire.

23.11 The bay marshalling kiosks shall be provided with danger plate and a diagram showing the numbering/connection/ earthing by pasting the same on the inside of the door.

23.12 a) The following routine tests alongwith the routine tests as per IS: 5039 shall also be conducted.

Check for wiring
Visual and dimension check

b) The enclosure of bay marshalling kiosk, junction box, terminal box shall be type tested for IP-55 as per IS: 13947. After IP-55 test, 2.5 kVrms for 1 (one) minute, insulation resistance and functional test should be conducted.

23.13 **Auxiliary Switches**

All the auxiliary switches shall be fully type tested as per relevant IS.

The following type test reports on auxiliary switches shall be submitted:

(a) Electrical endurance test - A minimum of 2000 operation for 2A D. C. with a time constant greater than or equal to 20 millisecond with a subsequent examination of mV drop/visual defects/temperature rise test.

(b) Mechanical endurance test. A minimum of 1,00,000 operations with a subsequent checking of contact pressure test/visual examination.

(c) Heat run test on contacts.

(d) IR/HV test etc.

TERMINAL BLOCKS AND WIRING

24.0

24.1 Control and instrument leads from the switchboards or from other equipment will be brought to terminal boxes or control cabinets in conduits. All interphase and external connections to equipment or to control cubicles will be made through terminal blocks.

24.2 Terminal blocks shall be 1100 V grade and have continuous rating to carry the maximum expected current on the terminals. These shall be of moulded piece, complete with insulated/barriers stud type terminals, washers, nuts and lock nuts. Screw clamp, overall insulated, insertion type, rail mounted terminals can be used in place of stud type terminals. But preferably the terminal blocks shall be non-disconnecting stud type of Elmex type CATM4, phoenix cage clamp type or equivalent. The insulating material of terminal block shall be nylon 6.6 which shall be free of halogens, fluorocarbons etc.

24.3 Terminal blocks for current transformer and voltage transformer secondary leads shall be provided with test links and isolating facilities. The current transformer secondary leads shall also be provided with short circuiting and earthing facilities.

24.4 The terminals shall be such that maximum contact area is achieved when a cable is terminated. The terminal shall have a locking characteristic to prevent cable from escaping from the terminal clamp unless it is done intentionally.

24.5 The conducting part in contact with cable shall preferably be tinned or silver plated, however Nickel plated copper or zinc plated steel shall also be acceptable.

24.6 The terminal blocks shall be of extensible design.

24.7 The terminal blocks shall have locking arrangement to prevent its escape from the mounting rails.

24.8 The terminal blocks shall be fully enclosed with removable covers of transparent, non-deterioration type plastic material. Insulating barriers shall be provided between the terminal blocks. These barriers shall not hinder the operator from carrying out the wiring without removing the barriers.

24.9 Unless otherwise specified terminal blocks shall be suitable for connecting the following conductors on each side.

- | | | |
|----|---------------------------------|---|
| a) | All circuits except CT circuits | Minimum of 2 nos. of 2.5 sq. mm copper flexible |
| b) | All CT circuits | Minimum of 4 nos. of 2.5 sq. mm copper flexible |

24.10 The arrangements shall be in such a manner so that it is possible to safely connect or disconnect terminals on live circuits and replace fuse links when the cabinet is live.

24.11	At least 20% spare terminals shall be provided on each panel/cubicle/box and these spare terminals shall be uniformly distributed on all terminal rows.	26.0	BUSHINGS, HOLLOW COLUMN INSULATORS, SUPPORT INSULATORS
24.12	There shall be minimum clearance of 250 mm between the first bottom row of terminal block and the associated cable gland plate. Also the clearance between two rows of terminal blocks shall be a minimum of 150 mm.	26.1	Bushings shall be manufactured and tested in accordance with IS: 2099 & IEC-60137 while hollow column insulators shall be manufactured and tested in accordance with IEC-62155/IS:5621. The support insulators shall be manufactured and tested as per IS:2544/IEC-60169 and IEC-60273. The insulators shall also conform to IEC-60815 as applicable.
24.13	The Bidder shall furnish all wire, conduits and terminals for the necessary interphase electrical connections (where applicable) as well as between phases and common terminal boxes or control cabinets.		The bidder may also offer composite silicon rubber insulator, conforming to IEC-61462.
24.14	All input and output terminals of each control cubicle shall be tested for surge withstand capability in accordance with the relevant IEC Publications, in both longitudinal and transverse modes. The Bidder shall also provide necessary filtering, surge protection, interface relays and any other measures necessary to achieve an impulse withstand level at the cable interfaces of the equipment.	26.2	Support insulators, bushings and hollow column insulators shall be manufactured from high quality porcelain. Porcelain used shall be homogeneous, free from laminations, cavities and other flaws or imperfections that might affect the mechanical or dielectric quality and shall be thoroughly vitrified tough and impervious to moisture.
25.0	LAMPS AND SOCKETS	26.3	Glazing of the porcelain shall be uniform brown in colour, free from blisters, burrs and similar other defects.
25.1	Lamps	26.4	Support insulators/bushings/hollow column insulators shall be designed to have ample insulation, mechanical strength and rigidity for the conditions under which they will be used.
25.2	Sockets	26.5	When operating at normal rated voltage there shall be no electric discharge between the conductors and bushing which would cause corrosion or injury to conductors, insulators or supports by the formation of substances produced by chemical action. No radio interference shall be caused by the insulators/bushings when operating at the normal rated voltage.
25.3	Hand Lamp	26.6	Bushing porcelain shall be robust and capable of withstanding the internal pressures likely to occur in service. The design and location of clamps and the shape and the strength of the porcelain flange securing the bushing to the tank shall be such that there is no risk of fracture. All portions of the assembled porcelain enclosures and supports other than gaskets, which may in any way be exposed to the atmosphere shall be composed of completely non hygroscopic material such as metal or glazed porcelain.
25.4	Switches and Fuses	26.7	All iron parts shall be hot dip galvanised and all joints shall be air tight. Surface of joints shall be trued up porcelain parts by grinding and metal parts by machining. Insulator/bushing design shall be such as to ensure a uniform compressive pressure on the joints.
	Each panel shall be provided with necessary arrangements for receiving, distributing, isolating and fusing of DC and AC supplies for various control, signalling, lighting and space heater circuits. The incoming and sub-circuits shall be separately provided with miniature circuit breaker/ switchfuse units. Selection of the main and Sub-circuit fuse ratings shall be such as to ensure selective clearance of sub-circuit faults. Potential circuits for relaying and metering shall be protected by HRC fuses.	26.8	Tests
	All fuses shall be of HRC cartridge type conforming to IS-9228 mounted on plug-in type fuse bases. Miniature circuit breakers with thermal protection and alarm contacts will also be accepted. All accessible live connection to fuse bases shall be adequately shrouded. Fuses shall have operation indicators for indicating blown fuse condition. Fuse carrier base shall have imprints to the fuse rating and voltage. All control switches shall be of rotary type. Toggle piano switches shall not be accepted.		In bushing, hollow column insulators and support insulators shall conform to type tests and shall be subjected to routine tests in accordance with IS: 2099 & IS: 2544 & IS : 5621.
		27.0	MOTORS
			Motors shall be "Squirrel Cage" three phase induction motors of sufficient size capable of satisfactory operation for the application and duty as required for the driven equipment and shall be subjected to routine tests as per applicable standards. The motors shall be of approved make.
		27.1	Enclosures

- a) Motors to be installed outdoor without enclosure shall have hose proof enclosure equivalent to IP-55 as per IS: 4691. For motors to be installed indoor i.e. inside a box, the motor enclosure, shall be dust proof equivalent to IP-44 as per IS: 4691.
- b) Two independent earthing points shall be provided on opposite sides of the motor for bolted connection of earthing conductor.
- c) Motors shall have drain plugs so located that they will drain water resulting from condensation or other causes from all pockets in the motor casing.
- d) Motors weighing more than 25 Kg. shall be provided with eyebolts, lugs or other means to facilitate lifting.

27.2

Operational Features

- a) Continuous motor rating (name plate rating) shall be at least ten (10) percent above the maximum load demand of the driven equipment at design duty point and the motor shall not be over loaded at any operating point of driven equipment that will rise in service.
- b) Motor shall be capable at giving rated output without reduction in the expected life span when operated continuously in the system.

27.3

Starting Requirements

- a) All induction motors shall be suitable for full voltage direct-on-line starting. These shall be capable of starting and accelerating to the rated speed alongwith the driven equipment without exceeding the acceptable winding temperature even when the supply voltage drops down to 80% of the rated voltage.
- b) Motors shall be capable of withstanding the electrodynamic stresses and heating imposed if it is started at a voltage of 110% of the rated value.
- c) The locked rotor current shall not exceed six (6) times the rated full load current for all motors, subject to tolerance as given in IS:325.
- d) Motors when started with the driven equipment imposing full starting torque under the supply voltage conditions specified, shall be capable of withstanding atleast two successive starts from cold condition at room temperature and one start from hot condition without injurious heating of winding. The motors shall also be suitable for three equally spread starts per hour under the above referred supply condition.
- e) The locked rotor withstand time under hot condition at 110% of rated voltage shall be more than starting time with the driven equipment of minimum permissible voltage by at least two seconds or 15% of the accelerating time whichever is greater. In case it is not possible to meet the above requirement, the Bidder shall offer centrifugal type speed switch mounted on the motor shaft which shall remain closed for speed lower than 20% and open for speeds above 20% of the rated speed. The speed switch shall be capable of withstanding 120% of the rated speed in either direction of rotation.

27.4

Running Requirements

- a) The maximum permissible temperature rise over the ambient temperature of 50 degree C shall be within the limits specified in IS:325 (for 3 - phase induction motors) after adjustment due to increased ambient temperature specified.
- b) The double amplitude of motor vibration shall be within the limits specified in IS: 4729.

Vibration shall also be within the limits specified by the relevant standard for the driven equipment when measured at the motor bearings.

- c) All the induction motors shall be capable of running at 80% of rated voltage for a period of 5 minutes with rated load commencing from hot condition.

27.5 TESTING AND COMMISSIONING

The Bidder shall conduct following tests alongwith list of instruments and calibration certificates to the Purchaser. If any additional test is required the same shall be conducted without any extra cost to the Purchaser.

- (a) Insulation resistance.
- (b) Phase sequence and proper direction of rotation.
- (c) Any motor operating incorrectly shall be checked to determine the cause and the conditions corrected.

28.0 TECHNICAL REQUIREMENT OF EQUIPMENTS

28.1 Circuit Breakers (Applicable for 400KV, 220KV & 132 KV)

28.1.(i) The manufacturer(s) whose SF6 Circuit Breaker are offered should have designed, manufactured tested as per IEC/IS or equivalent standard supplied the same for the specified system voltage and 40KA/ 50KA fault level or above class which are in satisfactory operation for at least 2 (two) years as on the date of bid opening

Or

28.1.(ii) The manufacturer(s) whose SF6 Circuit Breaker are offered who have recently established production line in India for the specified system voltage or above class, based on technological support of a parent company or collaborator for the respective equipment(s) can also be considered provided the parent company (Principal) or collaborator meets qualifying requirements stipulated under clause no 28.1.(i) given above.

And

28.1.(iii) Furnishes (jointly with parent company or collaborator) a legally enforceable undertaking to guarantee quality, timely supply, performance and warranty obligations as specified for the equipment(s)

And

28.1.(iv) Furnishes a confirmation letter from the parent company or collaborator along with the bid stating that parent company or collaborator shall furnish performance guarantee for an amount of 10% of the cost of such equipment(s). This performance guarantee shall be in addition to contract performance guarantee to be submitted by the Bidder

28.2 Isolators (Applicable for 400KV, 220KV & 132KV)

28.2.(i) The manufacturer whose isolator are offered, should have designed, manufactured & tested as per IS/IEC or equivalent standard and supplied the isolator for the specified system voltage and 40KA/ 50KA fault level or above class and should be in satisfactory operation for at least 2 (two) years as on the date of bid opening

Or

28.2.(ii) The manufacturer(s) whose Isolator are offered who have recently established production line in India for the specified system voltage or above class, based on technological support of a

parent company or collaborator for the respective equipment(s) can also be considered provided the parent company (Principal) or collaborator meets qualifying requirements stipulated under clause no 28.2.(i) given above.	guarantee quality, timely supply, performance and warranty obligations as specified for the equipment(s)
And	And
28.2.(ii)(b) Furnishes (jointly with parent company or collaborator) a legally enforceable undertaking to guarantee quality, timely supply, performance and warranty obligations as specified for the equipment(s)	Furnishes a confirmation letter from the parent company or collaborator alongwith the bid stating that parent company or collaborator shall furnish performance guarantee for an amount of 10% of the cost of such equipment(s). This performance guarantee shall be in addition to contract performance guarantee to be submitted by the Bidder.
And	And
28.2.(iii)(c) Furnishes a confirmation letter from the parent company or collaborator along with the bid stating that parent company or collaborator shall furnish performance guarantee for an amount of 10% of the cost of such equipment(s). This performance guarantee shall be in addition to contract performance guarantee to be submitted by the Bidder	220 kV Grade XLPE Power Cables The cable shall be from the manufacturer who must have designed, manufactured, type tested and supplied in a single contract at least 15 (fifteen) km of single core, 220kV or higher grade XLPE insulated cable which must be in operation for at least 2 (two) years as on the date of bid opening.
28.3 Instrument Transformers (Applicable for 400kV, 220kV & 132kV)	220 kV Grade XLPE Power Cables
28.3.(i) The manufacturer whose instrument transformers are offered, should have designed, manufactured & tested as per IS/IEC or equivalent standard and supplied the same for the specified system voltage for CT & VT and 40kA/ 50kA fault level or above class. These equipment should be in satisfactory operation for at least 2 (two) years as on the date of bid opening	132 kV Grade XLPE Power Cables The cable shall be from the manufacturer who must have designed, manufactured, type tested and supplied in a single contract at least 15 (fifteen) km of single core, 132kV or higher grade XLPE insulated cable which must be in operation for at least 2 (two) years as on the date of bid opening.
Or	Or
28.3.(ii)(a) The manufacturer(s) whose Instrument Transformer are offered who have recently established production line in India for the specified system voltage or above class, based on technological support of a parent company or collaborator for the respective equipment(s) can also be considered provided the parent company (Principal) or collaborator meets qualifying requirements stipulated under clause no 28.3.(i) given above.	33 kV Grade XLPE Power Cables The cable shall be from the manufacturer who must have designed, manufactured, type tested and supplied in a single contract at least 15 (fifteen) km of single core, 33kV or higher grade XLPE insulated cable which must be in operation for at least 2 (two) years as on the date of bid opening.
And	And
28.3.(ii)(b) Furnishes (jointly with parent company or collaborator) a legally enforceable undertaking to guarantee quality, timely supply, performance and warranty obligations as specified for the equipment(s)	1.1 kV Grade Power & Control Cables
And	And
28.3.(ii)(c) Furnishes a confirmation letter from the parent company or collaborator alongwith the bid stating that parent company or collaborator shall furnish performance guarantee for an amount of 10% of the cost of such equipment(s). This performance guarantee shall be in addition to contract performance guarantee to be submitted by the Bidder	Applicable for PVC Control Cable The manufacturers, whose PVC control cables are offered, should have designed, manufactured, tested and supplied in a single contract at least 100 kms of 1.1 kV grade PVC insulated control cables as on the date of bid opening. Further the manufacturer should also have designed, manufactured, tested and supplied at least 1 km of 27C x 2.5 Sq.mm or higher size as on the date of bid opening.
28.4 Surge Arresters (Applicable for 400kV, 220kV & 132kV)	Applicable for PVC Power Cable
(a) The manufacturer whose Surge Arresters are offered should have designed, manufactured and tested as per IEC/IS or equivalent standard and supplied the Surge Arrester for the specified energy capability with rated system voltage and which are in satisfactory operation for at least 2 (two) years as on the date of bid opening.	The manufacturer, whose PVC Power Cables are offered, should have designed, manufactured, tested and supplied in a single contract atleast 100 kms of 1.1 kV or higher grade PVC insulated power cables as on the date of bid opening. Further the manufacturer should also have designed, manufactured, tested and supplied at least 1 km of 1C x 150 Sq. mm or higher size as on the date of bid opening.
Or	Or
(b) The manufacturer(s) whose Surge Arrestors are offered who have recently established production line in India for the specified system voltage or above class, based on technological support of a parent company or collaborator for the respective equipment(s) can also be considered provided the parent company (Principal) or collaborator meets qualifying requirements stipulated under clause no (a) given above.	Applicable for XLPE Power Cables The Manufacturer, whose XLPE Power cables are offered, should have designed, manufactured,
And	And
Furnishes (jointly with parent company or collaborator) a legally enforceable undertaking to	

tested and supplied in a single contract atleast 25 kms of 1.1 kV or higher grade XLPE insulated power cables as on the date of bid opening. Further the manufacturer should also have designed, manufactured, tested and supplied at least 1 km of 1C x 630 Sq. mm or higher size as on the date of bid opening.

28.9 LT Switchgear

28.9.1 The Manufacturer whose LT Switchgear are offered, should be a manufacturer of LT Switchboards of the type and rating being offered. He should have designed, manufactured, tested and supplied at least 50 nos. draw out circuit breaker panels, out of which at least 5 nos. should have been with relay and protection schemes with current transformer. He should have also manufactured at least 50 nos. MCC panels comprising of MCCBs (ie Moulded Case Circuit Breakers) modules of the type offered which should be in successful operation as on date of bid opening.

28.9.2 The Switchgear items (such as circuit breakers, fuse switch units, contactors etc.), may be of his own make or shall be procured from reputed manufacturers and of proven design. At least one hundred circuit breakers of the make and type being offered shall be operating satisfactory as on date of bid opening.

28.10 Battery and Battery Charger

28.10.1 Requirements for Battery Manufacturers

The manufacturer whose Batteries are offered should have designed, manufactured and supplied DC Batteries of the type specified and being offered, having a capacity of at least 600 AH and these shall be operating satisfactorily for two years in power sector and/or industrial installations as on date of bid opening.

28.10.2 Requirements for Battery Charger Manufacturers

The manufacturer, whose Battery Chargers are offered, should have designed, manufactured and supplied Battery Chargers generally of the type offered, with static automatic voltage regulators and having a continuous output of at least ten (10) KW and these should be in successful as on the date of bid opening.

28.11 LT Transformers

The manufacturer, whose transformers are offered should have designed, manufactured, type tested including short circuit test as per IEC/IS or equivalent standards and supplied transformers of at least 33 kV class of 800 kVA or higher. The transformer should have been in successful operation for at least 2 years as on the date of bid opening.

28.12 Fire Fighting System

The bidder or his sub-vendor should have designed, supplied, tested, erected and commissioned at least one number fire protection system of the each type described in (i), (ii), (iii) and (iv) below in installations such as power plants, substations, refineries, fertilizer plants or other industrial or commercial installations. Such systems must have been designed to the recommendations of Tariff Advisory Committee of India or any other international reputed

authority like (FDC, London or NFPA, USA etc.) executed during last ten (10) years and should have been in successful operation for at least 2 (two) years as on the date of bid opening.

- i) Nitrogen Injection Fire Prevention cum Extinguishing System
- ii) Portable Fire Extinguishers
- iii) Gi Buckets – 9.0 liters capacity and Steel stand for Buckets
- iv) Fire Detection and Alarm System

In case bidder himself do not meet the requirement of design, he can engage a consultant(s) who must have designed the above system, which must be in successful operation for at least two years as on the date of bid opening.

28.13 Control and Relay Panels (400 kV, 220 kV, 132 kV & 33 kV)

The manufacturer whose Control, Relay & Protection System (Control & protection Intelligent Electronic Devices (IEDs)), and Sub-station Automation System (If applicable) are offered should have designed, manufactured, tested, installed and commissioned Control, Relay & Protection system along with Sub-station Automation System which must be in satisfactory operation on specified voltage level or above for atleast 2 (two) years on the date of bid opening.

AND

The Manufacturer or their joint venture or subsidiary company must have established repair, testing and integration (for at least 4 bays) facilities for Control, Relay & Protection System and Sub-station Automation System in India.

CORONA AND RADIO INTERFERENCE VOLTAGE (RIV) TEST

1.0

General

Unless otherwise stipulated, all equipment together with its associated connectors, where applicable, shall be tested for external corona (for 400 kV & above) both by observing the voltage level for the extinction of visible corona under falling power frequency voltage and by measurement of radio interference voltage (RIV) for 132 kV above.

2.0

Test Levels

The test voltage levels for measurement of external RIV and for corona extinction voltage are listed under the relevant clauses of the specification.

3.0

Test Methods for RIV

3.1 RIV tests shall be made according to measuring circuit as per International Special-Committee on Radio Interference (CISPR) Publication 16-1(1993) Part -1. The measuring circuit shall preferably be tuned to frequency with 10% of 0.5 MHz but other frequencies in the range of 0.5 MHz to 2 MHz may be used, the measuring frequency being recorded. The results shall be in microvolts.

3.2

Alternatively, RIV tests shall be in accordance with NEMA standard Publication No. 107-1964, except otherwise noted herein.

3.3

In measurement of, RIV, temporary additional external corona shielding may be provided. In measurements of RIV only standard fittings of identical type supplied with the equipment and a simulation of the connections as used in the actual installation will be permitted in the vicinity within 3.5 meters of terminals.

3.4

Ambient noise shall be measured before and after each series of tests to ensure that there is no variation in ambient noise level. If variation is present, the lowest ambient noise level will form basis for the measurements. RIV levels shall be measured at increasing and decreasing voltages of 85%, 100%, and 110% of the specified RIV test voltage for all equipment unless otherwise specified. The specified RIV test voltage for 400kV, 220kV, 132kV is listed in the detailed specification together with maximum permissible RIV level in microvolts.

3.5

The metering instruments shall be as per CISPR recommendation or equivalent device so long as it has been used by other testing authorities.

3.6

The RIV measurement may be made with a noise meter. A calibration procedure of the frequency to which noise meter shall be tuned shall establish the ratio of voltage at the high voltage terminal to voltage read by noise meter.

4.0

Test Methods for Visible Corona

The purpose of this test is to determine the corona extinction voltage of apparatus, connectors etc. The test shall be carried out in the same manner as RIV test described above with the exception that RIV measurements are not required during test and a search technique shall be used near the onset and extinction voltage, when the test voltage is raised

and lowered to determine their precise values. The test voltage shall be raised to 110% of specified corona extinction voltage and maintained there for five minutes. In case corona inception does not take place at 110%, test shall be stopped, otherwise test shall be continued and the voltage will then be decreased slowly until all visible corona disappears. The procedure shall be repeated at least 4 times with corona inception and extinction voltage recorded each time. The corona extinction voltage for purposes of determining compliance with the specification shall be the lowest of the four values at which visible corona (negative or positive polarity) disappears. Photographs with laboratory in complete darkness shall be taken under test conditions, at all voltage steps i.e. 85%, 100%, and 110%. Additional photographs shall be taken at corona inception and extinction voltages. At least two views shall be photographed in each case using Panchromatic film with an ASA daylight rating of 400 with an exposure of two minutes at a lens aperture of f/5.6 or equivalent. The photographic process shall be such that prints are available for inspection and comparison with conditions as determined from direct observation. Photographs shall be taken from above and below the level of connector so as to show corona on bushing, insulators and all parts of energised connectors. The photographs shall be framed such that test object essentially, fills the frame with no cut-off.

For recording purpose, modern devices utilizing UV recording methods such as image intensifier may also be used.

4.1

The test shall be recorded on each photograph. Additional photograph shall be taken from each camera position with lights on to show the relative position of test object to facilitate precise corona location from the photographic evidence.

4.2

In addition to photographs of the test object preferably four photographs shall be taken of the complete test assembly showing relative positions of all the test equipment and test objects. These four photographs shall be taken from four points equally spaced around the test arrangement to show its features from all sides. Drawings of the laboratory and test set up locations shall be provided to indicate camera positions and angles. The precise location of camera shall be approved by Purchaser's inspector, after determining the best camera locations by trial energisation of test object at a voltage which results in corona.

4.3

The test to determine the visible corona extinction voltage need not be carried out simultaneously with test to determine RIV levels.

4.4

However, both test shall be carried out with the same test set up and as little time duration between tests as possible. No modification on treatment of the sample between tests will be allowed. Simultaneous RIV and visible corona extinction voltage testing may be permitted at the discretion of Purchaser's inspector if, in his opinion, it will not prejudice other test.

5.0

Test Records

In addition to the information previously mentioned and the requirements specified as per CISPR or NEMA 107-1964 the following data shall be included in test report:

- a) Background noise before and after test.
- b) Detailed procedure of application of test voltage.
- c) Measurements of RIV levels expressed in micro volts at each level.

- d) Results and observations with regard to location and type of interference sources detected at each step.
- e) Test voltage shall be recorded when measured RIV passes through 100 microvolts in each direction.
- f) Onset and extinction of visual corona for each of the four tests required shall be recorded.

ANNEXURE – B

SEISMIC WITHSTAND TEST PROCEDURE

The seismic withstanding test on the complete equipment (for 132 kV and above) shall be carried out alongwith supporting structure.

The Bidder shall arrange to transport the structure from his Contractor's premises/UPPTCL sites for the purpose of seismic withstand test only.

The seismic level specified shall be applied at the base of the structure. The accelerometers shall be provided at the Terminal Pad of the equipment and any other point as agreed by the Purchaser. The seismic test shall be carried out in all possible combinations of the equipment. The seismic test procedure shall be furnished for approval of the Purchaser.

ANNEXURE – C

LIST OF SPECIFICATIONS

GENERAL STANDARDS AND CODES

India Electricity Rules	-	Colors for Ready Mixed Paints and Enamels.
Indian Electricity Act	-	New Insulating Oils.
Indian Electricity (Supply) Act	-	Aluminium and Aluminium Alloy Ingots and Castings for General Engineering Purposes
Indian Factories Act	-	Methods of Test for Petroleum and its Products.
IS-5,	-	Methods of High Voltage Testing.
IS-335,	-	Classification of degrees of protection provided by enclosures of electrical equipment.
IS-617,	-	Insulation Coordination.
IS-1448 (P1 to P 145)	-	Code of Practice for Earthing
IS-2071 (P1 to P3)	-	Method of Test for Specific Resistance (Resistivity) of Electrical Insulating Liquids
IS-12063	-	Method of Test for Interfacial Tension of Oil against Water by the Ring Method
IS-2165	-	Method of test for Power factor & Dielectric Constant of Electrical Insulating Liquids.
P1:1997	-	Method for determination of electric strength of insulating oils.
P2:1983	-	Guide for marking of insulated conductors.
IS-3043	-	Guide for uniform system of marking & identification of conductors & apparatus terminals.
IS-6103	-	Methods for Radio Interference Test on High voltage Insulators.
IS-6104	-	Low Voltage Fuses
IS-6262	-	High Voltage Test Techniques
IS-6792	-	Environmental Test
IS-5578	-	
IS-11353	-	
IS-8263	-	
IS-9224 (Part 1,2&4)	-	
IEC-60060 (Part 1 to P4)	-	
IEC 60068	-	

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IEC-60117	-	Graphical Symbols	CSA-Z299.4-1979h	-	Inspection Program Requirements
IEC-60156,	-	Method for the Determination of the Electrical Strength of Insulation Oils.			
IEC-60270,	-	Partial Discharge Measurements.			
IEC-60376	-	Specification and Acceptance of New Sulphur Hexafluoride			
IEC-60437	-	Radio Interference Test on High Voltage Insulators.			
IEC-60507	-	Artificial Pollution Tests on High Voltage Insulators to be used on AC Systems.			
IEC-62271-1	-	Common Specification for High Voltage Switchgear & Controlgear Standards.			
IEC-60815	-	Guide for the Selection of Insulators in respect of Polluted Conditions.			
IEC-60865 (P1 & P2)	-	Short Circuit Current - Calculation of effects.			
ANSI-C.1/NFPA.70	-	National Electrical Code			
ANSI-C37.90A	-	Guide for Surge Withstand Capability (SWC) Tests			
ANSI-C63.21,	-	Specification for Electromagnetic Noise and			
C63.3	-	Field Strength Instrumentation 10 KHz to 1 GHz			
C36.4ANSI-C68.1	-	Technique for Dielectric Tests			
ANSI-C76.1/IEEE21	-	Standard General Requirements and Test Procedure for Outdoor Apparatus Bushings.			
ANSI-SI-4	-	Specification for Sound Level Metres			
ANSI-Y32-2/C337.2	-	Drawing Symbols			
ANSI-Z55.11	-	Gray Finishes for Industrial Apparatus and Equipment No. 61 Light Gray			
NEMA-107T	-	Methods of Measurements of RIV of High Voltage Apparatus			
NEMA-ICS-II	-	General Standards for Industrial Control and Systems Part ICSI-109			
CISPR-1	-	Specification for CISPR Radio Interference Measuring Apparatus for the frequency range 0.15 MHz to 30 MHz			
CSA-Z299.1-1978h	-	Quality Assurance Program Requirements			
CSA-Z299.2-1979h	-	Quality Control Program Requirements			
CSA-Z299.3-1979h	-	Quality Verification Program Requirements			
TRANSFORMERS AND REACTORS					
IS-10028 (Part 2 & 3)	-	Code of practice for selection, installation & maintenance of Transformers (P1:1993), (P2:1991), (P3:1991)			
IS-2026 (P1 to P4)	-	Power Transformers			
IS-3347 (part 1 to Part 8)	-	Dimensions for Porcelain transformer Bushings for use in lightly polluted atmospheres.			
IS-3639	-	Fittings and Accessories for Power Transformers			
IS-6600	-	Guide for Loading of Oil immersed Transformers.			
IEC-60076 (Part 1 to 5)	-	Power Transformers			
IEC-60214	-	On-Load Tap-Changers.			
IEC-60289	-	Reactors.			
IEC- 60354	-	Loading Guide for Oil - Immersed power transformers			
IEC-60076-10	-	Determination of Transformer and Reactor Sound Levels			
ANSI-C571280	-	General requirements for Distribution, Power and Regulating Transformers			
ANSI-C571290	-	Test Code for Distribution, Power and Regulation Transformers			
ANSI-C5716	-	Terminology & Test Code for Current Limiting Reactors			
ANSI-C5721	-	Requirements, Terminology and Test Code for Shunt Reactors Rated Over 500 KVA			
ANSI-C5792	-	Guide for Loading Oil-Immersed Power Transformers upto and including 100 MVA with 55 deg C or 65 deg C Winding Rise			
ANSI-CG,IEEE-4	-	Standard Techniques for High Voltage Testing			
CIRCUIT BREAKERS					
IEC-62271-100	-	High-voltage switchgear and controlgear - Part 100: Alternating current circuit-breakers			
IEC-62271-101	-	High-voltage switchgear and controlgear - Part 101:			

IEC-62155	- Synthetic testing Hollow pressurized and unpressurized ceramic and glass insulators for use in electrical equipment with rated voltages greater than 1000 V	- Metal oxide lightning arrestors without gaps. Metal oxide surge arrestors without gaps Selection and application recommendation IEE Standards for S A for AC Power Circuits Surge Arresters	- IEC-60099-4 IEC-60099-5 ANSI-C62.1 NEMA-LA 1
IEC-62271-110	- High-voltage switchgear and controlgear - Part 110: Inductive load switching	-	- ANSI-C62.1 NEMA-LA 1
IEC-62271-109	- High-voltage switchgear and controlgear - Part 110: Inductive load switching	-	-
CURRENT TRANSFORMERS, VOLTAGE TRANSFORMERS AND COUPLING			
CAPACITOR VOLTAGE TRANSFORMERS			
IS-2705- (P1 to P4)	- Current Transformers.	-	- IS-722, IS-1248, IS-3231, 3231 (P-3) IS:5039
IS:3156- (P1 to P4)	- Voltage Transformers.	-	- Electrical relays for power system protection Distributed pillars for Voltages not Exceeding 1000 Volts.
IS-4379	- Identification of the Contents of Industrial Gas Cylinders	-	- Basic environmental testing procedures Part 2: Test B: Dry heat Degree of Protection provided by enclosures.
IEC-60044-1	- Current transformers.	-	- Low voltage switchgear and control gear.
IEC-60044-2	- Inductive Voltage Transformers.	-	- Electromechanical Contactors for household and similar purposes.
IEC-60044-4	- Instrument Transformers : Measurement of Partial Discharges	-	- Low Voltage Switchgear and control gear assemblies
IEC-60044-5	- Instrument transformers - Part 5: Capacitor voltage transformers	-	- Switchgear Assemblies, including metal enclosed bus.
IEC-60358	- Coupling capacitors and capacitor dividers.	-	- Test Procedures for Low Voltage Alternating Current Power Circuit Breakers
IEC-60481	- Coupling Devices for power Line Carrier Systems.	-	- Electric Measuring Instrument
ANSI-CS713	- Requirements for Instrument transformers	-	- Components for Electric Equipment
ANSI-C92.2	- Power Line Coupling voltage Transformers	-	- Specification for Switchgear & Control Assemblies.
ANSI-C93.1	- Requirements for Power Line Carrier Coupling Capacitors	-	- Moulded Case Circuit and Systems Industrial Controls and Systems Panel Boards
BUSHING	-	-	- Low voltage Power Circuit breakers Power Switchgear Assemblies Power switching Equipment Motor Control Centers
IS-2099	- Bushings for Alternating Voltages above 1000V	-	- Direct acting indicating analogue electrical
IEC-60137	- Insulated Bushings for Alternating Voltages above 1000V	-	-
SURGE ARRESTERS			
IS-3070 (PART2)	- Lightning arresters for alternating current systems	-	- 1248 (P1 to P9)

	measuring instruments & their accessories.		EIA	-	Electric Industries Association
Disconnecting Switches					
IEC-62271-102	-	High-voltage switchgear and controlgear - Part 102: Alternating current disconnectors and earthing switches	IEC-60051 : (P1 to P9)	-	Recommendations for Direct Acting indicating analogue electrical measuring instruments and their accessories.
IEC-60129	-	Alternating Current Disconnectors (Isolators) and Earthing switches	IEC-60255 (Part 1 to 23)	-	Electrical relays.
IEC-1129	-	Alternating Current Earthing Switches Induced Current switching	IEC-60297 (P1 to P4)	-	Dimensions of mechanical structures of the 482.6mm (19 inches) series.
IEC-60265 (Part 1 & 2)	-	High Voltage switches	IEC-60359	-	Expression of the performance of electrical & electronic measuring equipment.
ANSI-C37.32	-	Schedule of preferred Ratings, Manufacturing Specifications and Application Guide for high voltage Air Switches, Bus supports and switch accessories	IEC-60387	-	Symbols for Alternating-Current Electricity meters.
ANSI-C37.34	-	Test Code for high voltage air switches	IEC-60447	-	Man machine interface (MMI) - Actuating principles.
NEMA-S66	-	Power switching equipment	IEC-60521	-	Class 0.5, 1 and 2 alternating current watt hour metres
PLCC and Line Traps					
IS-8792	-	Line traps for AC power system.	IEC-60547	-	Modular plug-in Unit and standard 19-inch rack mounting unit based on NIM Standard (for electronic nuclear instruments)
IS-8793	-	Methods of tests for line traps.	ANSI-81	-	Screw threads
IS-8997	-	Coupling devices for PLC systems.	ANSI-B18	-	Bolts and Nuts
IS-8998	-	Methods of test for coupling devices for PLC systems.	ANSI-C37.1	-	Relays, Station Controls etc.
IEC-60353	-	Line traps for A.C. power systems.	ANSI-C37.2	-	Manual and automatic station control, supervisory and associated telemetering equipment
IEC-60481	-	Coupling Devices for power line carrier systems.	ANSI-C37.2	-	Relays and relay systems associated with electric power apparatus
IEC-60495	-	Single sideboard power line carrier terminals	ANSI-C39.1	-	Requirements for electrical analog indicating Instruments
IEC-60683	-	Planning of (single Side-Band) power line carrier systems.	MOTORS		
CIGRE	-	Teleprotection report by Committee 34 & 35.			
CIGRE	-	Guide on power line carrier 1979.	IS-325	-	Three phase induction motors.
CCIR	-	International Radio Consultative Committee	IS-4691	-	Degree of protection provided by enclosure for rotating electrical machinery.
CCITT	-	International Telegraph & Telephone Consultative Committee	IEC-60034 (P1 to P19:)	-	Rotating electrical machines

IEC-Document 2 (Central Office) NEMA-MGI Motors and Generators	-	Three phase induction motors	-	IEC-62155	Hollow pressurized and unpressurized ceramic and glass insulators for use in electrical equipment with rated voltages greater than 1 000 V
Electronic Equipment and Components					
MIL-21B, MIL-833 & MIL-2750	-	Environmental testing	-	IEC-60233	Tests on Hollow Insulators for use in electrical equipment.
IEC-60068 (P1 to P5)	-	Printed boards	-	IEC-60273	Characteristics of indoor and outdoor post insulators for systems with nominal voltages greater than 1000V.
IEC-60326 (P1 to P2)	-	Material and workmanship standards	-	IEC-61462	Pressurized and un-pressurized insulator for use in electrical equipment with rated voltage greater than 1000V – Definitions, Test methods, acceptance criteria and design recommendations
IS-1363 (P1 to P3)	-	Hexagon headbolts, screws and nuts of product grade C.	-	IEC-60305	Insulators for overhead lines with nominal voltage above 1000V-ceramic or glass insulator units for a.c. systems Characteristics of String Insulator Units of the cap and pintype.
IS-1364 (P1 to P5)	-	Hexagon head bolts, screws and nuts of products grades A and B.	-	IEC-60372 (1984)	Locking devices for ball and socket couplings of string insulator units : dimensions and tests.
IS-3138	-	Hexagonal Bolts and Nuts (M42 to M150)	-	IEC-60383 (P1 and P2)	Insulators for overhead lines with a nominal voltage above 1000 V.
ISO-898	-	Fasteners: Bolts, screws and studs	-	IEC-60433	Characteristics of string insulator units of the long rod type.
ASTM	-	Specification and tests for materials	-	IEC-60471	Dimensions of Clevis and tongue couplings of string insulator units.
Clamps & Connectors					
IS-5561	-	Electric power connectors.	-	ANSI-C29	Wet process porcelain insulators
NEMA-CC1	-	Electric Power connectors for sub station	-	ANSI-C29.1	Test methods for electrical power insulators
NEMA-CC 3	-	Connectors for Use between aluminium or aluminium-Copper Overhead Conductors	-	ANSI-C92.2	For insulators, wet-process porcelain and toughened glass suspension type
Bus Hardware and Insulators					
IS: 2121	-	Fittings for Aluminum and steel cored Al conductors for overhead power lines.	-	ANSI-C29.8	For wet-process porcelain insulators apparatus, post-type
IS-731	-	Porcelain insulators for overhead power lines with a nominal voltage greater than 1000 V.	-	ANSI-G.8	Iron and steel hardware
IS-2486 (P1 to P4)	-	Insulator fittings for overhead power lines with a nominal voltage greater than 1000 V.	-	CISPR-78	Recommendations of the CISPR, tolerances of form and of Position, Part 1
IEC-60120	-	Dimensions of Ball and Socket Couplings of string insulator units.	-	ASTM A-153	Zinc Coating (Hot-Dip) on iron and steel hardware
IEC-60137	-	Insulated bushings for alternating voltages above 1000 V.	-	Strain and Rigid Bus-Conductor	
IEC-60168	-	Tests on indoor and outdoor post insulators of ceramic material or glass for Systems with Nominal Voltages Greater than 1000 V.	-	IS-267B	Dimensions & tolerances for Wrought Aluminum and Aluminum Alloys drawn round tube.

IS-5082	-	Wrought Aluminum and Aluminum Alloy Bars. Rods, Tubes and Sections for Electrical purposes.			Batteries
ASTM-B 230-82	-	Aluminum 1350 H19 Wire for electrical purposes		IEEE-1115	- Sizing of Ni-Cd Batteries
ASTM-B 231-81	-	Concentric - lay - stranded, aluminum 1350 conductors		IEEE-1187	- Recommended practices for design & installation of VRLA Batteries
ASTM-B 221	-	Aluminum - Alloy extruded bar, rod, wire, shape		IEEE-1188	- Recommended practices for design & installation of VRLA Batteries
ASTM-B 236-83	-	Aluminum bars for electrical purpose (Bus-bars)		IEEE-1189	- Guide for selection of VRLA Batteries
ASTM-B 317-83	-	Aluminum-Alloy extruded bar, rod, pipe and structural shapes for electrical purposes (Bus Conductors)			
Batteries and Batteries Charger					
Battery					
IS:1651	-	Stationary Cells and Batteries, Lead-Acid Type (with Tubular Positive Plates)		IS:3895	- Mono-crystalline Semiconductor Rectifier Cells and Stacks
IS:1652	-	Stationary Cells and Batteries, Lead-Acid Type (with Plante Positive Plates)		IS:4540	- Mono-crystalline Semiconductor Rectifier Assemblies and Equipment.
IS:1146	-	Rubber and Plastic Containers for Lead-Acid Storage Batteries		IS:6619	- Safety Code for Semiconductor Rectifier Equipment
IS:6071	-	Synthetic Separators for Lead-Acid Batteries		IS:2026	- Power Transformers
IS:266	-	Specification for Sulphuric Acid		IS:2959	- AC Contactors for Voltages not Exceeding 1000 Volts
IS:1069	-	Specification for Water for Storage Batteries		IS:1248	- Indicating Instruments
IS:3116	-	Specification for Sealing Compound for Lead-Acid Batteries		IS:2208	- HRC Fuses
IS:1248	-	Indicating Instruments		IS:13947 (Part-3)	- Air break switches, air break disconnectors & fuse combination units for voltage not exceeding 1000V AC or 1200V DC
IS:10918	-	Vented type nickel Cadmium Batteries		IS:2147	- Degree of protection provided by enclosures for low voltage switchgear and controlgear.
IEC:60896-21&22	-	Lead Acid Batteries Valve Regulated types – Methods of Tests & Requirements		IS:6005	- Code of practice for phosphating of Iron and Steel
IEC: 60623	-	Vented type nickel Cadmium Batteries		IS:3231	- Electrical relays for power system protection
IEC:60622	-	Secondary Cells & Batteries – Sealed Ni-Cd rechargeable single cell		IS:3842	- Electrical relay for AC Systems
IEC:60623	-	Secondary Cells & Batteries – Vented Ni-Cd rechargeable single cell		IS:5	- Colours for ready mix paint
IEC:60896-11	-	Stationary Lead Acid Batteries – Vented Type – General requirements & method of tests		IEEE-484	- Recommended Design for installation design and installation of large lead storage batteries for generating stations and substations.
IEEE-485	-	Recommended practices for sizing of Lead Acid		IEEE-485	- Sizing large lead storage batteries for generating stations and substations
Wires and Cables					

ASTMD-2863	-	Measuring the minimum oxygen concentration to support candle like combustion of plastics (oxygen index)	IEC-60287 (P1 to P3)	-	Calculation of the continuous current rating of cables (100% load factor).
IS-694	-	PVC insulated cables for working voltages upto and including 1100 Volts.	IEC-60304	-	Standard colours for insulation for low-frequency cables and wires.
IS-1255	-	Code of practice for installation and maintenance of power cables, upto and including 33 kV rating	IEC-60331	-	Fire resisting characteristics of Electric cables.
IS-1554 (P1 and P2)	-	PVC insulated (heavy duty) electric cables (part 1) for working voltage upto and including 1100 V.	IEC-60332 (P1 to P3)	-	Tests on electric cables under fire conditions.
	-	Part (2) for working voltage from 3.3 kV upto and including 11kV.	IEC-60502	-	Extruded solid dielectric insulated power cables for rated voltages from 1 kV upto to 30 kV
IS-1753	-	Aluminium conductor for insulated cables	IEC-754 (P1 and P2)	-	Tests on gases evolved during combustion of electric cables.
IS-2982	-	Copper Conductor in insulated cables.	Air Conditioning and Ventilation		
IS-3961 (P1 to P5)	-	Recommended current ratings for cables.	IS-659	-	Safety code for air conditioning
IS-3975	-	Mild steel wires, formed wires and tapes for armouring of cables.	IS-660	-	Safety code for Mechanical Refrigeration
IS-5831	-	PVC insulating and sheath of electric cables.	ARI-520	-	Standard for Positive Displacement Refrigeration Compressor and Condensing Units
IS-6380	-	Elastometric insulating and sheath of electric cables.	IS-4503	-	Shell and tube type heat exchanger
IS-7098	-	Cross linked polyethylene insulated PVC sheathed cables for working voltage upto and including 1100 volts.	ASHRAE-24	-	Method of testing for rating of liquid coolers
IS-7098	-	Cross-linked polyethylene insulated PVC sheathed cables for working voltage from 3.3kV upto and including 33 kV.	ANSI-B-31.5	-	Refrigeration Piping
IS-8130	-	Conductors for insulated electrical cables and flexible cords.	IS-2062	-	Steel for general structural purposes
IS-1753	-	Aluminum Conductors for insulated cables.	IS-655	-	Specification for Metal Air Dust
IS-10418	-	Specification for drums for electric cables.	IS-277	-	Specification for Galvanised Steel Sheets
IEC-60096 (part 0 to p4)	-	Radio Frequency cables.	IS-737	-	Specification for Wrought Aluminium and Aluminium Sheet & Strip
IEC-60183	-	Guide to the Selection of High Voltage Cables.	IS-1079	-	Hot rolled cast steel sheet & strip
IEC-60189 (P1 to P7)	-	Low frequency cables and wires with PVC insulation and PVC sheath.	IS-3588	-	Specification for Electrical Axial Flow Fans
IEC-60227 (P1 to P7)	-	Polyvinyl Chloride insulated cables of rated voltages up to and including 450/750V.	IS-2312	-	Propeller Type AC Ventilation Fans
IEC-60228	-	Conductors of insulated cables	BS-848	-	Methods of Performance Test for Fans
IEC-60230	-	Impulse tests on cables and their accessories.	BS-6540 Part-I	-	Air Filters used in Air Conditioning and General Ventilation
	-		BS-3928	-	Sodium Flame Test for Air Filters (Other than for Air Supply to I.C. Engines and Compressors)
	-		US-PED-2098	-	Method of cold DOP & hot DOP test
	-		MIL-5TD-282	-	DOP smoke penetration method
	-		ASHRAE-52	-	Air cleaning device used in general ventilation for

IS:3069	-	removing particle matter	IS:2633	-	on iron and steel.
IS:4671	-	Glossary of Terms, Symbols and Units Relating to Thermal Insulation Materials.	ASTM-A-123	-	Methods for testing uniformity of coating of zinc coated articles.
IS:8183	-	Expanded Polystyrene for Thermal Insulation Purposes	ASTM-A-121-77	-	Specification for zinc (Hot Galvanizing) Coatings, on products Fabricated from rolled, pressed and forged steel shapes, plates, bars and strips.
IS:3346	-	Bonded Mineral Wool			Zinc-coated (Galvanized) steel barbed wire
ASTM-C-591-69	-	Evaluation of Thermal Conductivity properties by means of guarded hot plate method	Painting		
IS:4894	-	Standard specification for rigid preformed cellular urethane thermal insulation	IS-6005	-	Code of practice for phosphating of iron and steel.
BS:848 Fans	-	Centrifugal Fans	ANSI-Z551	-	Gray finishes for industrial apparatus and equipment
IS:325	-	Method of Performance Test for Centrifugal Fans	SSPEC	-	Steel structure painting council
IS:4722	-	Induction motors, three-phase	Fire Protection System		
IS:1231	-	Rotating electrical machines			
IS:2233	-	Three phase foot mounted Induction motors, dimensions of	Fire protection manual issued by tariff advisory committee (TAC) of India		
IS:2254	-	Designations of types of construction and mounting arrangements of rotating electrical machines	HORIZONTAL CENTRIFUGAL PUMPS		
IS:7816	-	Vertical shaft motors for pumps, dimensions of	IS:1520	-	Horizontal centrifugal pumps for clear, cold and fresh water
IS:4029	-	Guide for testing insulation resistance of rotating machines	IS:9137	-	Code for acceptance test for centrifugal & axial pumps
IS:4729	-	Guide for testing three phase induction motors	IS:5120	-	Technical requirement - Rotodynamic special purpose pumps
IS:4691	-	Rotating electrical machines, vibration of, Measurement and evaluation of	API-610	-	Centrifugal pumps for general services
IS:7572	-	Degree of protection provided by enclosures for rotating electrical machinery	BS:599	-	Hydraulic Institutes Standards
IS:2148	-	Guide for testing single-phase a.c. motors	PTC-8.2	-	Methods of testing pumps
BS:4999 (Part-51)	-	Flame proof enclosure for electrical apparatus			Power Test Codes - Centrifugal pumps
	-	Noise levels			
Galvanizing			DIESEL ENGINES		
IS-209	-	Zinc Ingot	IS:10000	-	Methods of tests for internal combustion engines
IS-2629	-	Recommended Practice for Hot-Dip galvanizing	IS:10002	-	Specification for performance requirements for

BS:5514	-	constant speed compression ignition engines for general purposes (above 20 kW)	IS:3582	-	Basket strainers for fire fighting purposes (cylindrical type)
		The performance of reciprocating compression ignition (Diesel) engines, utilising liquid fuel only, for general purposes	IS:3589	-	Electrically welded steel pipes for water, gas and sewage (150 to 2000 mm nominal diameter)
ISO:3046	-	Reciprocating internal combustion engines performance	IS:4038	-	Foot valves for water works purposes
IS:554	-	Dimensions for pipe threads where pressure tight joints are required on threads	IS:4927	-	Unlined flax canvas hose for fire fighting
ASME Power Test Code	-	Internal combustion engine PTC-17	IS:5290	-	Landing valves (internal hydrant)
	-	Codes of Diesel Engine Manufacturer's Association, USA	IS:5312 (Part-I)	-	Swing check type reflex (non-return) valves
			IS:5306	-	Code of practice for fire extinguishing installations and equipment on premises
			Part-I	-	Hydrant systems, hose reels and foam inlets
			Part-II	-	Sprinkler systems
			BS:5150	-	Specification for cast iron gate valves

PIPING VALVES & SPECIALITIES

IS:636	-	Non percolating flexible fire fighting delivery hose
IS:638	-	Sheet rubber jointing and rubber inserting jointing
IS:778	-	Gun metal gate, globe and check valves for general purpose
IS:780	-	Sluice valves for water works purposes (50 to 300 mm)
IS:901	-	Couplings, double male and double female instantaneous pattern for fire fighting
IS:902	-	Suction hose couplings for fire fighting purposes
IS:903	-	Fire hose delivery couplings branch pipe nozzles and nozzle spanner
IS:1538	-	Cast iron fittings for pressure pipes for water, gas and sewage
IS:1903	-	Ball valve (horizontal plunger type) including floats for water supply purposes
IS:2062	-	SP for weldable structural steel
IS:2379	-	Colour Code for the identification of pipelines
IS:2643	-	Dimensions of pipe threads for fastening purposes
IS:2685	-	Code of Practice for selection, installation and maintenance of sluice valves
IS:2906	-	Sluice valves for water-works purposes (350 to 1200 mm size)

MOTORS & ANNUNCIATION PANELS

IS:325	-	Three phase induction motors
IS:900	-	Code of practice for installation and maintenance of induction motors
IS:996	-	Single phase small AC and universal electric motors
IS:1231	-	Dimensions of three phase foot mounted induction motors
IS:2148	-	Flame proof enclosure of electrical apparatus
IS:2223	-	Dimensions of flange mounted AC induction motors
IS:2253	-	Designations for types of construction and mounting arrangements of rotating electrical machines
IS:2254	-	Dimensions of vertical shaft motors for pumps
IS:3202	-	Code of practice for climate proofing of electrical equipment
IS:4029	-	Guide for testing three phase induction motors
IS:4691	-	Degree of protection provided by enclosure for rotating electrical machinery
IS:4722	-	Rotating electrical machines

IS:4729	-	Measurement and evaluation of vibration of rotating electrical machines	IS:2878	-	CO2 (Carbon dioxide) Type Extinguisher
IS:5572	-	Classification of hazardous areas for electrical (Part-I) installations (Areas having gases and vapours)	IS:2171	-	DC (Dry Chemical Powder) type
IS:6362	-	Designation of methods of cooling for rotating electrical machines	IS:940	-	Pressurised Water Type
IS:6381	-	Construction and testing of electrical apparatus with type of protection 'e'	D.G. SET		
IS:7816	-	Guide for testing insulation for rotating machine	IS:10002	-	Specification for performance requirements for constant speed compression ignition (diesel engine) for general purposes
IS:4064	-	Air break switches	IS:10000	-	Method of tests for internal combustion engines
IEC DOCUMENT 2 (Control Office) 432	-	Three Phase Induction Motor	IS:4722	-	Rotating electrical machines-specification
VDE 0530 Part 1/66	-	Three Phase Induction Motor	IS:12063	-	Degree of protection provided by enclosures
IS:9224 (Part-II)	-	HRC Fuses	IS:12065	-	Permissible limit of noise levels for rotating electrical machines.
IS:6875	-	Push Button and Control Switches		-	Indian Explosive Act 1932
IS:694	-	PVC Insulated cables	Steel Structures		
IS:1248	-	Indicating instruments	IS-228 (1992)	-	Method of Chemical Analysis of pig iron, cast iron and plain carbon and low alloy steels.
IS:375	-	Auxiliary wiring & busbar markings	IS-802 (P1 to 3:)	-	Code of practice for use of structural steel in overhead transmission line towers.
IS:2147	-	Degree of protection			
IS:5	-	Colour Relay and timers	IS-806	-	Code of practice for use of steel tubes in general building construction
IS:2959	-	Contactors	IS-808	-	Dimensions for hot rolled steel beam, column channel and angle sections.
PG Test Procedures			IS-814	-	Covered electrodes for manual arc welding of carbon of carbon manganese steel.
NFPA-13	-	Standard for the installation of sprinkler system	IS-816	-	Code of Practice for use of metal arc welding for general construction in Mild steel
NFPA-15	-	Standard for water spray fixed system for the fire protection	IS-817	-	Code of practice for training and testing of metal arc welders. Part 1 : Manual Metal arc welding.
NFPA-12A	-	Standard for Halong 1301 Fire Extinguishing System	IS-875 (P1 to P4)	-	Code of practice for design loads (other than earthquake) for buildings and structures.
NFPA-72E	-	Standard on Automatic Fire Detectors	IS-1161	-	Steel tubes for structural purposes.
Fire Protection Manual by TAC (Latest Edition)			IS-1182	-	Recommended practice for radiographic examination of fusion welded butt joints in steel
NFPA-12	-	Standard on Carbon dioxide extinguisher systems			
IS:3034	-	Fire of industrial building.			
Electrical generating and distributing stations code of practice					

IS-1363 (P1 to P3)	plates. Hexagonal head bolts, screws & nuts of products grade C.	-	ASTM-441	tower bolts and nuts Specification for High strength low alloy structural manganese vanadium steel.
IS-1364	Hexagon headbolts, screws and nuts of product grades A and B.	-	ASTM-A572	Specification for High strength low alloy columbium-Vanadium steel of structural quality
IS-1367 (P1 to P18)	Technical supply condition for threaded steel fasteners.	-	AWS D1-0	Code for welding in building construction welding inspection
IS-1599	Methods for bend test.	-	AWS D1-1	Structural welding code
IS-1608	Method for tensile testing of steel products.	-	AISC	American institute of steel construction
IS-1893	Criteria for earthquake resistant design of structures.	-	NEMA-CG1	Manufactured graphite electrodes
IS-1978	Line Pipe.	-	Piping and Pressure Vessels	
IS-2062	Steel for general structural purposes.	-	IS-1239 (Part 1 and 2)	Mild steel tubes, tubulars and other wrought steel
IS-2595	Code of practice for Radiographic testing.	-	IS-3589	fittings Seamless Electrically welded steel pipes for water, gas and sewage.
IS-3063	Single coil rectangular section spring washers for bolts, nuts and screws.	-	IS-6392	Steel pipe flanges
IS-3664	Code of practice for ultrasonic pulse echo testing by contact and immersion methods.	-	ASME	Boiler and pressure vessel code
IS-7205	Safety code for erection of structural steel work.	-	ASTM-A120	Specification for pipe steel, black and hot dipped, zinc-coated (Galvanized) welded and seamless steel pipe for ordinary use
IS-9595	Recommendations for metal arc welding of carbon and carbon manganese steels.	-	ASTM-A53	Specification for pipe, steel, black, and hotdipped, zinc coated welded and seamless
ANSI-B18.2.1	Inch series square and Hexagonal bolts and screws	-	ASTM-A106	Seamless carbon steel pipe for high temperature service
ANSI-B18.2.2	Square and hexagonal nuts	-	ASTM-A284	Low and intermediate tensile strength carbonsilicon steel plates for machine parts and general construction.
ANSI-G8.14	Round head bolts	-	ASTM-A234	Pipe fittings of wrought carbon steel and alloy steel for moderate and elevated temperatures
ASTM-A6	Specification for General Requirements for rolled steel plates, shapes, sheet piling and bars of structural use	-	ASTM-S181	Specification for forgings, carbon steel for general purpose piping
ASTM-A36	Specifications of structural steel	-	ASTM-A105	Forgings, carbon steel for piping components
ASTM-A47	Specification for malleable iron castings	-	ASTM-A307	Carbon steel externally threaded standard fasteners
ASTM-A143	Practice for safeguarding against embilement of Hot Galvanized structural steel products and procedure for detaching embrilement	-	ASTM-A193	Alloy steel and stainless steel bolting materials for
ASTM-A242	Specification for high strength low alloy structural steel	-		
ASTM-A283	Specification for low and intermediate tensile strength carbon steel plates of structural quality	-		
ASTM-A394	Specification for Galvanized steel transmission	-		

ASTM-A345	-	high temperature service	IS-516	-	Method of test for strength of concrete.
	-	Flat rolled electrical steel for magnetic applications	IS-800	-	Code of practice for general construction in steel.
ASTM-A197	-	Cupola malleable iron	IS-806	-	Steel tubes for structural purposes.
ANSI-B2.1	-	Pipe threads (Except dry seal)	IS-1172	-	Basic requirements for water supply, drainage and sanitation.
ANSI-B16.1	-	Cast iron pipe flanges and flanged fitting, Class 25, 125, 250 and 800	IS-1199	-	Methods of sampling and analysis of concrete.
ANSI-B16.1	-	Malleable iron threaded fittings, class 150 and 300	IS-1566	-	Hard-drawn steel wire fabric for concrete reinforcement.
ANSI-B16.5	-	Pipe flanges and flanged fittings, steel nickel alloy and other special alloys	IS-1742	-	Code of Practice for Building drainage..
ANSI-B16.9	-	Factory-made wrought steel butt welding fittings	IS-1785	-	Plain hard-drawn steel wire for prestressed concrete.
ANSI-B16.11	-	Forged steel fittings, socket-welding and threaded	IS-1786	-	High strength deformed Steel Bars and wires for concrete reinforcement.
ANSI-B16.14	-	Ferrous pipe plug, bushings and locknuts with pipe threads	IS-1811	-	Methods of sampling Foundry sands.
ANSI-B16.25	-	Butt welding ends	IS-1893	-	Criteria for earthquake resistant design of structures.
ANSI-B18.1.1	-	Fire hose couplings screw thread.	IS-2062	-	Steel for general structural purposes.
ANSI-B18.2.1	-	Inch series square and hexagonal bolts and screws	IS-2064	-	Selection, installation and maintenance of sanitary appliances-code of practices.
ANSI-B18.2.2	-	Square and hexagonal nuts	IS-2065	-	Code of practice for water supply in buildings.
NSI-B18.21.1	-	Lock washers	IS-2090	-	High tension steel bars used in prestressed concrete.
ANSI-B18.21.2	-	Plain washers	IS-2140	-	Standard Galvanized steel wire for fencing.
ANSI-B31.1	-	Power piping	IS-2470 (P1 & P2)	-	Code of practice for installation of septic tanks.
ANSI-B36.10	-	Welded and seamless wrought steel pipe	IS-2514	-	Concrete vibrating tables.
ANSI-B36.9	-	Stainless steel pipe	IS-2645	-	Integral cement waterproofing compounds.
Other Civil Works Standards					
IS-269	-	33 grade ordinary portland cement.	IS-3025 (Part 1 to Part 48)	-	Methods of sampling and test (Physical and chemical) for water and waste water.
IS2721	-	Galvanized steel chain link fence fabric	IS 4091	-	Code of practice for design and construction of foundations for transmission line towers and poles.
IS-278	-	Galvanized steel barbed wire for fencing.	IS-4111	-	Code of practice for ancillary structures in sewerage system.
IS-383	-	Coarse and fine aggregates from natural sources for concrete.	(Part 1 to P5)	-	
IS-432 (P1 and P2)	-	Mild steel and medium tensile steel bars and hard-drawn steel wire for concrete reinforcement.	IS-4990	-	Plywood for concrete shuttering work.
IS-456	-	Code of practice for plain and reinforced concrete.	IS-5600	-	Sewage and drainage pumps.

National Building Code of India 1970		
USBR E12	-	Earth Manual by United States Department of the interior Bureau of Reclamation
ASTM-A392-81	-	Zinc/Coated steel chain link fence fabric
ASTM-D1557-80	-	test for moisture-density relation of soils using 10-lb (4.5 kg) ramme land 18-in. (457 mm) Drop.
ASTM-D1586 (1967)	-	Penetration Test and Split-Barrel Sampling of Soils
ASTM-D2049-69	-	Test Method for Relative Density of Cohesionless Soils
ASTM-D2435	-	Test method for Unconsolidated, (1982) Undrained Strengths of Cohesive Soils in Triaxial Compression.
BS-5075	-	Specification for accelerating Part I Admixtures, Retarding Admixtures and Water Reducing Admixtures.
CPWD	-	Latest CPWD specifications
ACSR MOOSE CONDUCTOR		
IS:6745		Methods for Determination of BS:443-1969 Mass of zinc coating on zinc coated Iron and Steel Articles
IS:8263		Methods for Radio Interference
IEC:437-1973		Test on High Voltage Insulators NEMA:107-1964 CISPR
IS:209		Zinc Ingot BS:3436-1961
IS:398		Aluminum Conductors for IEC:209-1966
Part - V		Overhead Transmission Purposes
BS:215(Part-II)		Aluminium Conductors galvanized IEC:209-1966 steel reinforced extra high
BS:215(Part-I)		voltage (400 kV and above)
IS:1778		Reels and Drums for BS:1559-1949
		Bare Conductors
IS:1521		Method for Tensile Testing ISO/R89-1959 of steel wire
IS:2629		Recommended practice for Hot dip Galvanising on Iron and Steel.
IS:2633		Method for Testing Uniformity of coating of zinc Coated Articles.
IS:4826		Hot dip galvanised coatings on round steel wires ASTM-A-472-729
GALVANISED STEEL EARTHWIRE		
IS:1521		Method for Tensile Testing ISO/R:89-1959 of Steel Wire
IS:1778		Reels and Drums for Bare Conductors
IS:2629		Recommended practice for Hot Dip Galvanising on Iron and Steel.
IS:2633 Coated		Methods for testing Uniformity of Coating of Zinc Articles.
IS:4826		Hot dip Galvanised Coatings ASTM:A 475-72a on Round Steel Wires BS:443-1969
IS:6745		Method for Determination BS:443-1969 of mass of Zinc Coating on Zinc coated Iron and Steel Articles.
IS:209		Zinc ingot BS:3463-1961
IS:398 (Pt. I to P5:1992)		Aluminum Conductors for BS:215 (Part-II) overhead transmission purposes.
Lighting Fixtures and Accessories		
IS:1913		General and safety requirements for electric lighting fittings.
IS:3528		Water proof electric lighting fittings.
IS:4012		Dust proof electric lighting fittings.
IS:4013		Dust tight proof electric lighting fittings.
IS:10322		Industrial lighting fittings with metal reflectors.
IS:10322		Industrial lighting fittings with plastic reflectors.
IS:2206		Well glass lighting fittings for use under ground in mines

[illegible]

IS:6005 Code of practice of phosphating iron and steel
 IS:5082 Wrought Aluminum and Aluminum alloys for electrical purposes
 IS:2633 Hot dip galvanising

IS:8623 (Part-I) gear	Specification for low voltage switchgear and control assemblies
IS:13947 (Part-I) gear,	Specification for low voltage switchgear and control Part 1 General Rules
IS:13947 (part-2) gear,	Specification for low voltage switchgear and control Part 2 circuit breakers.
IS:13947 (part-3) gear.	Specification for low voltage switchgear and control Part 3 Switches, Disconnectors, Switch-disconnectors and fuse combination units
IS:13947 (part-4) gear.	Specification for low voltage switchgear and control Part 4 Contactors and motors starters.
IS:13947 (part-5) gear.	Specification for low voltage switchgear and control Part 5 Control-circuit devices and switching elements
IS:13947 (part-6) gear.	Specification for low voltage switchgear and control Part 6 Multiple function switching devices.
IS:13947 (part-7) gear.	Specification for low voltage switchgear and control Part 7 Ancillary equipments
IS:12063	Degree of protection provided by enclosures
IS:2705	Current Transformers
IS:3156	Voltage Transformers
IS:3231	Electrical relays for power system protection
IS:1248	Electrical indicating instruments
IS:722	AC Electricity meters
IS:5578	Guide for Marking of insulated conductors of apparatus terminals
IS:13703 (part 1) or	Low voltage fuses for voltage not exceeding 1000V AC
IS:13703 (part 2) or	1500V DC Part 1 General Requirements Low voltage fuses for voltage not exceeding 1000V AC 1500V DC Part 2 Fuses for use of authorized persons