BHARAT HEAVY ELECTRICALS LTD.
(TRANSMISSION BUSINESS GROUP)

NOTICE INVITING TENDER

Subject:	**Tender for supply and supervision of ETC of Circuit Breakers for Various PGCIL projects**
Project:	**1. 765kV AIS Pkg SS-46T for (a) Establishment of 765/400/220kV Barmer-I including 400kV, 2x125 MVAr Reactor; (b) Extn at 765kV Sirohi for termination of Barmer-I PS– Sirohi PS 765 kV D/c line; (c) Extn of 400kV Fatehgarh-III for termination of Fatehgarh-III (Section-2) PS – Barmer-I PS 400 kV D/c line.** **2. 765kV AIS Pkg SS-47T for (a) Establishment of 765/400/220/132kV Kurawar Substation (New) including 1x125MVAr 420kV (3-Ph)Bus Reactor, (b) Extn of 400kV Shujalpur for termination of 400kVD/C Shujalpur – Kurawar TL, (c) Extn of 400kV Ashtha S/s for LILO of one circuit of Indore-Itarsi 400 kV D/c line at Ashtha & for termination of Kurawar-Ashtha 400 kV D/c line and (d) Extn of 765kV Mandsaur for termination of Mandsaur – Kurawar 765 kV D/c line.** **3. Substation Package SS43T for (a) Establishment of 765/400/ 220kV Mandsaur S/s and (b) Extn. of 765kV Indore (PG) for termination of Mandsaur PS – Indore (PG) 765 kV D/c Line associated with "Transmission system for evacuation of power from Rajasthan REZ Ph-IV (Part-2 : 5.5GW) Jaisalmer/Barmer Complex)Part-C"**
Customer	**Powergrid Corporation of India Limited**

BHARAT HEAVY ELECTRICALS LTD.
(TRANSMISSION BUSINESS GROUP)

SPECIAL TERMS AND CONDITIONS FOR TENDER ENQUIRY / CONTRACT

IN CASE ANY DISCREPANCY BETWEEN THE REQUIREMENTS MENTIONED UNDER SPECIAL TERMS & CONDITIONS AND GENERAL TERMS & CONDITIONS, SPECIAL TERMS AND CONDITIONS SHALL PREVAIL.

THIS IS TO BE SUBMITTED DULY SIGNED AND STAMPED BY BIDDER. 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.

SL. NO.	TERMS AND CONDITIONS
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** Tender is invited through e-Procurement System only. The bidder shall submit their bid through e-Procurement platform only at (https://eprocurebhel.co.in/). Bidders participating through e-procurement portal for this tender should have Class-III Digital Signature Certificate (DSC) for Signing & Encryption of bids issued by any of the valid Certifying Authorities (approved by Controller of Certifying Authorities) in India. **1.3** Offer Submission Date & Time: xx.xx.2025, 11:00 Hrs IST, Offer Opening Date & Time: xx.xx.2025, 16:00 Hrs IST The critical Dates of tendering activities shall be provided separately during tendering processes. Address of tender Issuing Authority: - BHARAT HEAVY ELECTRICALS LIMITED, Transmission Business Group, 5th Floor, BHEL Sadan, Plot No. 25, Sector-16a, Noida – 201301 (U.P.) **1.4** For any technical clarification, kindly contact: **Mr. Jai Kumar Soni, DGM (TBEM)** Phone: +91 (0) 0120- 6748534, E-mail: jaik@bhel.in

SPECIAL TERMS AND CONDITIONS FOR TENDER ENQUIRY / CONTRACT

	1.5 For any commercial clarification, kindly contact: **Mr. Deep Shekhar Dewangan, Dy. Manager (TBMM)**; Phone: +91 (0) 0120- 6748450, E-mail: dsdewangan@bhel.in
2.	**PACKAGE**
	Following two packages are covered in this tender enquiry: **(i) Package-I: 765kV Circuit Breakers** **(ii) Package-II: 420kV/ 245kV/145kV/72.5 kV rating Circuit Breakers** Bidders may submit offer for Package-I or Package-II or both. Evaluation of package shall be done as per clause no. 18 of STC.
3.	**TECHNICAL SPECIFICATION**
	(i) Package-I: Technical specification no. TB-431-316-001A is applicable. **(ii) Package-**II: **Technical specification no. TB-431-316-001B** is applicable.
4.	**PRE QUALIFYING CRITERIA FOR OPEN TENDER**
	i) The Technical Pre-Qualification criteria is as per **ANNEXURE-I (A) & I (B)** **ii)** The Financial Parameters for Pre-QUALIFYING CRITERIA shall be as per **ANNEXURE-I (C)** Note: (1). Bidder must submit all supporting documents along with their offer. No deviation against this enquiry is acceptable, else offer shall be rejected. (2). All documents (including third party documents/supporting documents) in language other than English, certified translated copy in English language should also be furnished. (3). Offers will be scrutinized based on the qualifying requirements and only those who are technically and financially capable to execute the job and who fulfil the prequalifying requirements (PQR) are eligible to quote against above NIT.
5.	**PRE-BID MEETING**
	Not Applicable
6.	**BID SECURITY / EARNEST MONEY DEPOSIT (EMD)**
	NIL
7.	**PRICES:**
	(i) The prices as quoted in price schedule shall be on **Firm basis**. (ii) The prices shall be on INR basis.

Signature of Bidder (Authorized Signatory) with Date & Seal

SPECIAL TERMS AND CONDITIONS FOR TENDER ENQUIRY / CONTRACT

	(iii) 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. **This is a composite tender enquiry for various substations therefore supply/ services of same material/ items (i.e. items with same material code) may be appearing for different substation/ location. Bidder may please note that supply/ services ex-works price quoted for same items (i.e. items with same material code) for different substation should be same. In case it is found that any bidder has quoted different supply/ services ex-works prices for same item (with same material code), then the lowest quoted supply/ services ex-works price for that particular item(s) shall be considered for ordering purpose.** **b) Freight & Insurance:** Freight and Transit Insurance for door delivery up to destination/store is in scope of bidder. Freight and insurance are to be quoted separately. **c) Charges for Supervision of Erection, Testing & Commissioning (ETC) at Site:** To be quoted separately if specified in NIT/Price Schedule. (iv) GST rates along with HSN/SAC code as applicable on Sr No (a) to (c) above is to be mentioned separately in percentage in both un-priced bid and price bid. **Note:** i) The purchase order shall be placed on Ex-works basis. F&I (Freight & Insurance) up to site shall be in the scope of bidder. ii) Prices quoted shall be in Indian Rupees only. iii) Unloading at Site / Destination shall not be in the scope of the bidder. iv) Prices in respect of Sr No (a) to (c) of Clause 7.3 above are to be quoted inclusive of all taxes & Duties, charges. Levies, royalty etc. If any, excluding GST.
8.	**PRICE BID FORMAT**
	Bidder to quote their best prices strictly in BHEL's prescribed format of NIT, else their offer shall be liable to be rejected. Bidder has to mention "quoted" (in each applicable cell) in UN-PRICED BID. In case that cell is Not Applicable, "NA" must be mentioned in that particular cell. Prices shall be mentioned in Price bid schedule only. In case during detailed engineering stage, wherever, it is mentioned as NA (not applicable), is to be supplied, bidder shall supply the same without any cost and delivery implication to BHEL.

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SPECIAL TERMS AND CONDITIONS FOR TENDER ENQUIRY / CONTRACT

9.	TERMS OF PAYMENT
	[A] Payment for Supply: i) 95% of payment along with 100% GST & F&I shall be made within 45 days for MSE (Micro & Small Enterprises) / within 60 days for Medium Enterprises & non MSME suppliers from the date of receipt of complete invoice along with documents in 3 sets (original + 2 copies) as follows: • LR / GR • Material Receipt Certificate issued by BHEL (to be arrange by BHEL-TBG**) • 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 • Performance Security ** MRC shall be issued by BHEL site within 7-10 working days from the date of receipt of last consignment of each lot of dispatch (as per Invoice) at site and submission of following undertaking by vendor- "Boxes shall be opened in the presence of vendor's representative and in case of any shortage/damage found inside the factory packed boxes during verification, then vendor shall supply the same without any financial implications to BHEL." ii) Balance 05% of payment shall be made within 45 days for MSE (Micro & Small Enterprises) / within 60 days for Medium Enterprises & non MSME suppliers from the date of receipt of complete invoice along with documents in 3 sets (original + 2 copies) as follows: • Claim Invoice • 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 Note 01: In case commissioning of Circuit Breaker gets delayed beyond 06 months from the date of last delivery of purchase order for the reasons not attributable to supplier, supplier may claim this 5% payment of supply portion by furnishing following documents: • Claim Invoice • Copy of certificate issued by BHEL site in charge, confirming that delay in Commissioning is not attributable to supplier (to be arranged by BHEL TBG) • Copy of Bank Guarantee of equivalent value initially valid for 6 months from the date of submission of invoice with additional claim period of two months. In case commissioning is not successfully completed before expiry

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	of Bank Guarantee, BG shall be kept suitably extended till commissioning or 36 months from the date last delivery, whichever is earlier. **[B] Payment for Supervision of Erection, Testing & Commissioning (ETC):** 100% Payment for Supervision of Erection, Testing & Commissioning along with applicable GST shall be made on prorate basis within 45 days for MSE (Micro & Small Enterprises) / within 60 days for Medium Enterprises & non MSME suppliers against certificate of successful completion of supervision of Erection, Testing & Commissioning at Site issued by BHEL Site Official / Construction Management from the date of receipt of GST Compliant Tax invoice in 3 sets (original + 2 copies). Note: i) Supplier has to submit invoice(s) as per PO along with billing checklist (Annexure-III). ii) 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. iii) Supplier has to ensure commencement of transit insurance from the date not later than LR / GR date. iv) 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 v) 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. vi) Supplier has to submit Performance Security & Guarantee Certificate as per PO terms. vii) 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 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. viii) 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.

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	ix) 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. x) 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.
10.	**GUARANTEE**
	The contractor shall guarantee that the equipment being supplied under this contract shall be new and of first quality workmanship and 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 765kV / 400kV & Below rating Circuit Breakers- for 18 months from the date of last delivery OR Sixty (60) months from the date of Taking Over/Completion of Facilities*, whichever is later. *Taking over / Completion of facility: For purpose of guarantee, date of taking over/ completion of facilities is fixed as • 08.06.2026 for Mandsaur (New) & Indore (extn) • 26.10.2026 for Kurawar (New), Mandsaur (extn), Sujalpur (extn) & Ashtha (extn) • 30.11.2026 for Barmer (New), Sirohi (extn) & Fatehgarh-III (extn) 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. Notification of any transit damage will be sent by BHEL to supplier within 15 days from date of receipt of material 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 the reasonable period mutually agreed between BHEL and supplier. In the event of the supplier / contractor failing to replace the defective equipment / material / component within the time period mentioned above, the same shall be considered as breach of the contract and BHEL may proceed as per provision mentioned in this NIT without prejudice to any other rights under the contract. In the event of the supplier / contractor failing to replace the defective equipment / material / component within the time period mentioned above, the same shall be considered as breach of the contract and BHEL may proceed as per provision mentioned in this NIT without prejudice to any other rights under the contract.

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11. PERFORMANCE SECURITY

Performance security of 10% of Total Ex-works value (excl. Supervision charges) shall be submitted by the vendor within 30 days from the date of award of PO. Performance security shall be submitted separately for each PO. Ex-works PO value (excl. Supervision charges) at the time of placement of PO shall be considered for calculation of the performance security amount.

"Bidder agrees to submit performance security required for execution of the contract within the time period mentioned. In case of delay in submission of performance security, enhanced performance security which would include interest (SBI rate + 6%) for the delayed period, shall be submitted by the bidder. Further, if performance security is not submitted till such time the first bill becomes due, the amount of performance security due shall be recovered as per terms and conditions defined in NIT / Contract, from the bills along with due interest."

(A) Modes of deposit:

Performance security may be furnished in the following forms:

(i) Local cheques of Scheduled Banks (subject to realization)/ Pay Order/Demand Draft/ Electronic Fund Transfer in favor of BHEL -TBG, Noida. Bank Account details for EFT mode is mentioned in EMD clause.

Bank Account details for submission of performance security through EFT mode.

NAME OF THE COMPANY	BHARAT HEAVY ELECTRICALS LTD
ADDRESS OF THE COMPANY	TRANSMISSION BUSINESS GROUP, 5TH FLOOR, BHEL SADAN, PLOT NO. 25, SECTOR-16A, NOIDA – 201301 (U.P.)
NAME OF BANK	STATE BANK OF INDIA
NAME OF BANK BRANCH	CAG-II NEW DELHI (17313)
CITY	NEW DELHI
ACCOUNT NUMBER	00000030206227732
ACCOUNT TYPE	CASH CREDIT
IFSC CODE	SBIN0017313

(ii) Bank Guarantee from Scheduled Banks / Public Financial Institutions as defined in the Companies Act. Bank Guarantee shall be submitted as per BHEL format.

(iii) Fixed Deposit Receipt issued by Scheduled Banks / Public Financial Institutions as defined in the Companies Act (FDR should be in the name of the vendor, a/c BHEL).

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(iv) Securities available from Indian Post offices such as National Savings Certificates, Kisan Vikas Patras etc. (held in the name of vendor furnishing the security and duly endorsed/ hypothecated/pledged, as applicable, in favor of BHEL).

(v) Insurance Surety Bond.

(B) Forfeiture of performance security

The performance security will be forfeited and credited to BHEL's account in the event of a breach of contract by the vendor.

Important Notes:

(1) The performance security should remain valid for a period of 60 days beyond the date of completion of all contractual obligations of the supplier including warranty/Guarantee obligations.

(2) Performance security shall be refunded to the vendor without interest, after he duly performs and completes the contract in all respects but not later than 60(sixty) days of completion of all such obligations including the warranty under the contract.

(3) BHEL will not be liable or responsible in any manner for the collection of interest or renewal of the documents or in any other matter connected therewith.

(4) The Performance Security shall not carry any interest.

(5) Value of the Bank Guarantee shall remain unchanged for any subsequent variations in Purchase Order value up to ± 30%. Beyond this variation of ± 30%, the Supplier shall arrange to enhance or may reduce the value of the Bank Guarantee accordingly for the total variation promptly.

(6) The Bank Guarantee shall be from any bank as per Annexure-XIV for List of Banks. The original BG should be sent by issuing Bank directly to AGM (Finance), TBG, BHEL, Noida.

(7) Extension of validity of the BG in original, as per above clause, should be sent by issuing Bank directly to AGM (Finance), TBG, BHEL, Noida at least 45 days before expiry of validity of the BG.

(8) Non–submission BG / Deposit, as applicable, shall be considered as breach of contract as per terms of the NIT and BHEL reserves the right to impose Suspension of Business Dealings with the Supplier / Contractor.

(9) 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.

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12. DELIVERY LOCATION

Kurawar (New): NH-46 Highway, Kurawar Mandi, Vill. Raghokhedi, Tehsil-Narsinghgarh, Distt. Rajgarh (MP) Pin- 465667, Approx. 60 km from Bhopal Nearest Railway Station- Kalapipal (30km), Sehore (45 KM)	**Shujalpur (extn):** Shujalpur Power Grid Corporation of India Limited, 400/220kV Sub-Station, Vill.-Chitoda, Pacher Road, Tehsil-Shujalpur, Distt.-Shajapur (MP) 465333, Approx. 100 km from Bhopal Nearest Railway Station-Shujalpur (9km)
Ashtha (extn): 400kV Substation MPPTCL Shujalpur Road, Vill.-Hakimabad, Tehsil-Astha, Distt.-Sehore (MP), Pin 466116, Approx. 90 km from Bhopal Nearest Railway Station-Sehore (49 km)	**Mandsaur (extn):** Neemuch Transmission Limited 400/220 kV MPPTCL substation, Village - Laduna, Tehsil- Sitamau, District — Mandsaur, Pincode – 458990, Approx. 200 km from Indore Nearest Railway Station- Mandsaur (20 KM)
Mandsaur (New): POWERGRID 765/400/220 kV Mandsaur Substation Village Ranayara, Tehsil Malhargarh Mansdaur - Sanjeet Road, District Mandsaur Madhya Pradesh PIN 458 339	**Indore (extn):** POWERGRID 765/400 kV Substation, Village Hatunia PO Guran, Tehsil Sanwer, District Indore Madhya Pradesh PIN 453 551
Barmer (New) State- Rajasthan Address shall be informed later	**Sirohi (extn)** State- Rajasthan Address shall be informed later
Fatehgarh-III (extn) State- Rajasthan Address shall be informed later	

Actual site location and consignee details shall be shared with successful bidder(s) during project execution.

13. DELIVERY PERIOD

Proposed delivery plan:

Sl. No.	Project Name	Package-I (765kV CB)	Package-II (420kV & Below)
1	PGCIL Mandsaur (New)	Jan'26	Nov'25
2	PGCIL Indore (Extn)	Nov'25	NA

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	3	PGCIL Barmer-I (New)	June'26	Apr'26
	4	PGCIL Sirohi (Extn)	May'26	Mar'26
	5	PGCIL Kurawar (New)	Apr'26	Feb'26
	6	PGCIL Mandsaur (Extn)	Feb'26	Feb'26
	7	PGCIL Fatehgarh-III (Extn.)	NA	Mar'26
	8	PGCIL Shujalpur (Extn.)	NA	Jan'26
	9	PGCIL Ashtha (Extn.)	NA	Jan'26

Vendor to dispatch the material as per delivery plan mentioned in ACTIVITY SCHEDULE (attached) to meet the project requirement. Vendor to ensure supply/delivery of goods in time.

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).

The delivery conditions specified are for the contractual LD purpose. However, BHEL may ask for the early delivery without any compensation.

Note: LR / GR date or invoice date (whichever is later) shall be considered as delivery date.

14.	**LIQUIDATED DAMAGES FOR DELAYED DELIVERY**
	Liquidated Damages, wherever referred under this Tender/Agreement, shall mean and refer to the damages, not in the nature of penalty, which the contractor agrees to pay in the event of delay in delivery of supplies, breach of contract etc. as the case may be. Liquidated Damages leviable upon the Supplier/Vendor is a sum which is agreed by the parties as a reasonable and genuine pre-estimate of damages which will be suffered by BHEL on account of delay/breach on the part of the Supplier/Vendor. If the Seller/Service Provider fails to deliver any or all of the Goods/Services within the original/re-fixed delivery period(s) specified in the contract, the Buyer will be entitled to deduct/recover the Liquidated Damages for the delay, unless covered under Force

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	Majeure conditions aforesaid, @ 0.5% of the contract value of delayed quantity per week or part of the week of delayed period as pre-estimated damages not exceeding 05% of the contract value of delayed quantity without any controversy/dispute of any sort whatsoever. However, Liquidated Damage on delayed delivery shall be calculated input wise.
15.	**VALIDITY OF OFFER :**
	The offer shall be valid for 120 days from the date of opening of tender (i.e. techno-commercial bid unless otherwise specified in the NIT).
16.	**VENDOR APPROVAL/ ACCEPTANCE**
	• Bidder's offer will be considered for evaluation based on PQR, Technical and other commercial documents submitted along with bid. • Bidder's offer will be acceptable subject to final acceptance of bidder by ultimate customer as approved supplier. • The bidders which are not Powergrid approved supplier or not including in POWERGRID compendium, bidder shall submit necessary credentials/documents as per Annexure-XII for onward submission to customer for approval.
17.	**DEVIATION**
	Technical Deviation: No Technical Deviation is envisaged. Commercial Deviation: No Commercial Deviation envisaged except defined in GTC. The bids having deviation(s) w.r.t. tender is liable for rejection. However, BHEL, at its discretion, may load the prices for evaluation of offer with prior intimation to bidder. **Clause-wise deviations and / or additional conditions / clarifications, if any, are to be brought out clearly in "Schedule of Commercial Deviation" and "Schedule of Technical Deviation" If any. Deviations and / or additional conditions / clarifications, if any, mentioned elsewhere in the bid / offer, shall not be considered.**
18.	**TENDER EVALUATION**
	• Cost evaluation shall be done package wise [i.e. Separate evaluation for Package-I and Package-II] on total cost to BHEL basis. • Package wise comparative statement shall be prepared and evaluated on the basis of total cost to BHEL, considering Ex-Works Price, F&I and GST. GST input credit available to BHEL shall be reduced from prices while determining L1 status. • Evaluation in case of more than one L-1 bidders. In the course of evaluation, if more than one bidder happens to occupy L-1 status, effective L-1 will be decided by soliciting discount from respective L-1 In case more than one bidder happens to occupy the L-1 status even after soliciting discounts, the L-1 bidder shall be decided

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	by a toss/draw of lots, in the presence of the respective L-1 bidder(s) or their representative(s). • Ranking will be done accordingly. BHEL decision in such situations shall be final and binding.
19. .	**QUANTITY SPLITTING AND AWARDING:**
	(i) Package-I (765kV CB): **Entire quantity under this package shall be awarded to L1 bidder.** **(ii) Package-II (420kV/245kV/145kV/72.5kV rating CB):** **Entire quantity under this package shall be awarded to L1 bidder.**
20.	**VALIDITY OF PURCHASE ORDER:**
	Package wise and substation wise purchase orders shall be issued separately. The purchase order(s) shall be valid for one year from date of PO.
21.	**WORKS ADDRESS:**
	Bidders to mention their works address in Annexure-XV (Contact details of bidder).
22.	**Settlement of Dispute**
	If any dispute or difference of any kind whatsoever shall arise between BHEL and the Supplier/Vendor, arising out of the contract for the performance of the work whether during the progress of contract termination, abandonment or breach of the contract, it shall in the first place referred to Designated Engineer for amicable resolution by the parties. Designated Engineer (to be nominated by BHEL for settlement of disputes arising out of the contract) who within 60 days after being requested shall give written notice of his decision to the contractor. Save as hereinafter provided, such decision in respect of every matter so referred shall forthwith be given effect to by the Supplier/Vendor who shall proceed with the work with all due diligence, whether he or BHEL desires to resolve the dispute as hereinafter provided or not. If after the Designated Engineer has given written notice of this decision to the party and no intention to pursue the dispute has been communicated to him by the affected party within 30 days from the receipt of such notice, the said decision shall become final and binding on the parties. In the event the Supplier/Vendor being dissatisfied with any such decision or if amicable settlement cannot be reached then all such disputed issues shall be resolved through conciliation in terms of the BHEL Conciliation Scheme 2018 as per Clause 22.1. **22.1 Conciliation:** Any dispute, difference or controversy of whatever nature howsoever arising under or out of or in relation to this Agreement (including its interpretation) between the Parties,

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	and so notified in writing by either party to other party (the "Dispute") shall, in the first instance, be attempted to be resolved amicably in accordance with the conciliation procedure as per BHEL Conciliation Scheme 2018. The proceedings of Conciliation shall broadly be governed by Part-III of the Arbitration and Conciliation Act 1996 or any statutory modification thereof and as provided in "Procedure for conduct of conciliation proceedings" (as available in www.bhel.com)). **22.2 Arbitration:** **22.2.1** Except as provided elsewhere in this Contract, in case Parties are unable to reach amicable settlement (whether by Conciliation to be conducted as provided in Clause 22.1 herein above or otherwise) in respect of any dispute or difference; arising out of the formation, breach, termination, validity or execution of the Contract; or, the respective rights and liabilities of the Parties; or, in relation to interpretation of any provision of the Contract; or in any manner touching upon the Contract (hereinafter referred to as the 'Dispute'), then, either Party may, refer the disputes to Arbitral Institution "IIAC" (India International Arbitration Centre) and such dispute to be adjudicated by Sole Arbitrator appointed in accordance with the Rules of said Arbitral Institution. **22.2.2** A party willing to commence arbitration proceeding shall invoke Arbitration Clause by giving notice to the other party in terms of section 21 of the Arbitration & Conciliation Act, 1996 (hereinafter referred to as the 'Notice') before referring the matter to arbitral institution. The Notice shall be addressed to the Head of the Unit, BHEL, executing the Contract and shall contain the particulars of all claims to be referred to arbitration with sufficient detail and shall also indicate the monetary amount of such claim including interest, if any. **22.2.3** After expiry of 30 days from the date of receipt of aforesaid notice, the party invoking the Arbitration shall submit that dispute to the Arbitral Institutions and that dispute shall be adjudicated in accordance with their respective Arbitration Rules. The matter shall be adjudicated by a Sole Arbitrator who shall necessarily be a Retd. Judge having considerable experience in commercial matters to be appointed/nominated by the respective institution. The cost/expenses pertaining to the said Arbitration shall also be governed in accordance with the Rules of the respective Arbitral Institution. The decision of the party invoking the Arbitration for reference of dispute to a specific Arbitral institution for adjudication of that dispute shall be final and binding on both the parties and shall not be subject to any change thereafter. The institution once selected at the time of invocation of dispute shall remain unchanged. **22.2.4** The fee and expenses shall be borne by the parties as per the Arbitral Institutional rules. **22.2.5** The Arbitration proceedings shall be in English language and the seat and venue of Arbitration shall be New Delhi. **22.2.6** Subject to the above, the provisions of Arbitration & Conciliation Act 1996 and any amendment thereof shall be applicable. All matters relating to this Contract and arising out of invocation of Arbitration clause are subject to the exclusive jurisdiction of the Court(s) situated at New Delhi. **22.2.7** Notwithstanding any reference to the Designated Engineer or Conciliation or Arbitration herein, a. the parties shall continue to perform their respective obligations under the Contract unless they otherwise agree. Settlement of Dispute clause cannot be

	invoked by the Contractor, if the Contract has been mutually closed or 'No Demand Certificate' has been furnished by the Contractor or any Settlement Agreement has been signed between the Employer and the Contractor. **22.2.8** It is agreed that Mechanism of resolution of disputes through arbitration shall be available only in the cases where the value of the dispute is less than Rs. 10 Crores. **22.2.9** In case the disputed amount (Claim, Counter claim including interest is Rs. 10 crores and above, the parties shall be within their rights to take recourse to remedies other than Arbitration, as may be available to them under the applicable laws after prior intimation to the other party. Subject to the aforesaid conditions, provisions of the Arbitration and Conciliation Act, 1996 and any statutory modifications or re-enactment thereof as amended from time to time, shall apply to the arbitration proceedings under this clause. **22.2.10** In case, multiple arbitrations are invoked (whether sub-judice or arbitral award passed) by any party to under this contract, then the cumulative value of claims (including interest claimed or awarded) in all such arbitrations shall be taken in account while arriving at the total claim in dispute for the subject contract for the purpose of clause 22.2.9. Disputes having cumulative value of less than 10 crores shall be resolved through arbitration and any additional dispute shall be adjudicated by the court of competent jurisdiction. **22.3 In case of Contract with Public Sector Enterprise (PSE) or a Government Department, the following shall be applicable:** In the event of any dispute or difference relating to the interpretation and application of the provisions of commercial contract(s) between Central Public Sector Enterprises (CPSEs)/ Port Trusts inter se and also between CPSEs and Government Departments/Organizations (excluding disputes concerning Railways, Income Tax, Customs & Excise Departments), such dispute or difference shall be taken up by either party for resolution through AMRCD (Administrative Mechanism for Resolution of CPSEs Disputes) as mentioned in DPE OM No. 05/0003/2019-FTS-10937 dated 14-12-2022 as amended from time to time.
23.	**BREACH OF CONTRACT, REMEDIES AND TERMINATION**
	23.1 Following conditions shall be considered as breach of contract: i) Non-supply of material/ non-completion of work by the vendor within scheduled delivery/ completion period as per contract or as extended from time to time. ii) The vendor 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. iii) The vendor delivers equipment/ material not of the contracted quality. iv) The vendor fails to replace the defective equipment/ material/ component as per guarantee clause. v) Withdrawal from or abandonment of the work by the vendor before completion as per contract.

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vi) Assignment, transfer, subletting of Contract without BHEL's written permission resulting in termination of Contract or part thereof by BHEL.

vii) Non-compliance to any contractual condition or any other default attributable to Contractor/ Vendor.

viii) Any other reason(s) attributable to Vendor towards failure of performance of contract. In case of breach of contract, BHEL shall have the right to terminate the Purchase Order/ Contract either in whole or in part thereof without any compensation to the Supplier/Vendor.

ix) Any of the declarations furnished by the contractor at the time of bidding and/ or entering into the contract for supply are found untruthful and such declarations were of a nature that could have resulted in non-award of contract to the contractor or could expose BHEL and/ or Owner to adverse consequences, financial or otherwise.

x) Supplier/Vendor is convicted of any offence involving corrupt business practices, antinational activities or any such offence that compromises the business ethics of BHEL, in violation of the Integrity Pact entered into with BHEL has the potential to harm the overall business of BHEL/ Owner.

Note:

Once BHEL considers that a breach of contract has occurred on the part of Supplier/Vendor, BHEL shall notify the Supplier/Vendor by way of notice in this regard. Contractor shall be given an opportunity to rectify the reasons causing the breach of contract within a period of 14 days.

In case the contractor fails to remedy the breach, as mentioned in the notice, to the satisfaction of BHEL, BHEL shall have the right to take recourse to any of the remedial actions available to it under the relevant provisions of contract.

23.2 <u>Remedies for breach of contract:</u>

a) Wherein the period as stipulated in the notice issued under clause 22.1 has expired and Supplier/Vendor has failed to remedy the breach, BHEL will have the right to terminate the contract on the ground of "Breach of Contract" without any further notice to contractor.

b) Upon termination of contract, BHEL shall be entitled to recover an amount equivalent to 10% of the Contract Value for the damages on account of breach of contract committed by the Supplier/Vendor. This amount shall be recovered by way of encashing the security instruments like performance bank guarantee etc available with BHEL against the said contract. In case the value of the security instruments available is less than 10% of the contract value, the balance amount shall be recovered from other financial remedies (i.e. available bills of the Supplier/Vendor, retention amount, from the money due to the Supplier/Vendor etc. with BHEL) or the other legal remedies shall be pursued.

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c) wherever the value of security instruments like performance bank guarantee available with BHEL against the said contract is 10% of the contract value or more, such security instruments to the extent of 10% contract value will be encashed. In case no security instruments are available or the value of the security instruments available is less than 10% of the contract value, the 10% of the contract value or the balance amount, as the case may be, will be recovered in all or any of the following manners:

d) In case the amount recovered is not sufficient to fulfil the amount recoverable then; a demand notice to deposit the balance amount within 30 days shall be issued to Supplier/Vendor.

e) If Supplier/Vendor fails to deposit the balance amount within the period as prescribed in demand notice, following action shall be taken for recovery of the balance amount:
   i) from dues available in the form of Bills payable to defaulted Supplier/Vendor against the same contract.
   ii) If it is not possible to recover the dues available from the same contract or dues are insufficient to meet the recoverable amount, balance amount shall be recovered from any money(s) payable to Supplier/Vendor under any contract with other Units of BHEL including recovery from security deposits or any other deposit available in the form of security instruments of any kind against Security deposit or EMD.

f) In-case recoveries are not possible with any of the above available options, Legal action shall be initiated for recovery against defaulted supplier/Vendor.

g) It is an agreed term of contract that this amount shall be a genuine pre-estimate of damages that BHEL would incur in completion of balance contractual obligation of the contract through any other agency and BHEL will not be required to furnish any other evidence to the Supplier/Vendor for the purpose of estimation of damages.

h) In addition to the above, imposition of liquidated damages, debarment, termination, de-scoping, short-closure, etc., shall be applied as per provisions of the contract.

Note:

(1) The defaulting Supplier/Vendor shall not be eligible for participation in any of the future enquiries floated by BHEL to complete the balance work. The defaulting contractor shall mean and include:

(a) In case defaulted Supplier/Vendor is the Sole Proprietorship Firm, any Sole Proprietorship Firm owned by same Sole Proprietor.

(b) In case defaulted Supplier/Vendor is The Partnership Firm, any firm comprising of same partners/ some of the same partners; or sole proprietorship firm owned by any partner(s) as a sole proprietor.

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LD against delay in executed supply in case of Termination of Contract:

LD against delay in executed supply shall be calculated in line with LD clause no. 14.0, for the delay attributable to Supplier/Vendor. For limiting the maximum value of LD, contract value shall be taken as Executed Value of supply till termination of contract.

Method for calculation of "LD against delay in executed supply in case of termination of contract" is given below.

a) Let the time period from scheduled date of start of work till termination of contract excluding the period of Hold (if any) not attributable to contractor/ supplier = T1
b) Let the value of executed work/ supply till the time of termination of contract = X
c) Let the Total Executable Value of work/ supply for which inputs/ fronts were made available to contractor/ supplier and were planned for execution till termination of contract = Y
d) Delay in executed work/ supply attributable to contractor/ supplier i.e. T2 = [1-(X/Y)] x T1
e) LD shall be calculated in line with LD clause of the Contract for the delay attributable to supplier taking "X" as Contract Value and "T2" as delay attributable to contractor/ supplier.

Note: In case portion of service/ supply is withdrawn, no LD shall be applicable for portion of service/ supply withdrawn.

24. MICRO & SMALL ENTERPRISES (MSE)

Any bidder falling under MSE category shall submit Udyam Registration certificate along with their techno-commercial offer.

Type under MSE	SC/ST owned	Women owned	Others (excluding SC/ ST & Women Owned)
Micro			
Small			

Note:

a) If the bidder does not furnish the Udyam Registration certificate for MSE category, offer shall be processed construing that the bidder is not falling under MSE category.
b) Documents submitted by the bidder shall be verified by BHEL for rendering the applicable benefits.
c) MSE suppliers can avail the intended benefits in respect of the procurements related to the Goods and Services only (Definition of Goods and Services as enumerated by Govt. of India vide Office Memorandum F. No. 21(8)/2011-MA dtd. 09/11/2016 office of AS & DC, MSME) only if they submit Udyam Registration certificate along with the offer.

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	d) Bidder to select purchase preference in GeM Portal to avail MSE purchase preference for this enquiry. No purchase preference shall be applicable for this enquiry if MSE purchase preference is not selected by the bidder in GeM Portal.
25.	**REVERSE AUCTION**
	Not applicable for this enquiry.
26.	**INTEGRITY PACT**
	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. (a) IP is a tool to ensure that activities and transactions between the Company and its Bidders/ Contractors are handled in a fair, transparent and corruption free manner. Following Independent External Monitors (IEMs) on the present panel have been appointed by BHEL with the approval of CVC to oversee implementation of IP in BHEL.

Sl.	IEM	Email
1	Shri Otem Dai, IAS (Retd.)	iem1@bhel.in
2	Shri Bishwamitra Pandey, IRAS (Retd.)	Iem2@bhel.in
3	Shri Mukesh Mittal, IRS (retd.)	Iem3@bhel.in

(b) The IP as enclosed with the tender is to be submitted (duly signed by authorized signatory) along with techno-commercial bid (Part-I, in case of two/ three part bid). Only those bidders who have entered into such an IP with BHEL would be competent to participate in the bidding. In other words, entering into this Pact would be a preliminary qualification.
(c) Please refer Section-8 of IP for Role and Responsibilities of IEMs. In case of any complaint arising out of the tendering process, the matter may be referred to any of the above IEM(s). All correspondence with the IEMs shall be done through email only.
Note: No routine correspondence shall be addressed to the IEM (phone/ post/ email) regarding the clarifications, time extensions or any other administrative queries, etc on the tender issued. All such clarification/ issues shall be addressed directly to the tender issuing (procurement) department's officials whose contact details are provided below:

Details of contact person(s):

(1) Name: Mr. Deep Shekhar Dewangan Deptt: TBMM Address: BHEL Noida Phone: 0120 674 8450 Email: dsdewangan@bhel.in	**(2)** Name: Mr. Nandlal Verma Deptt: TBMM Address: BHEL Noida Phone: 0120 674 8477 Email: nverma@bhel.in

27.	**VARIATION OF CONTRACT VALUE / QUANTITY VARIATION**
	BHEL shall have the right to variation in quantities of items within -25% to +25% of the total Purchase Order / Contract value at the time of placement of PO or award of Contract

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	on overall basis for all amendments together within one year 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. **Note: In case the product is required for projects other than the specified in this enquiry, BHEL reserves the right to issue purchase orders to the successful bidder within the agreed quantity variation limits and supplier shall be bound to accept the same. However, such order will be placed within six months from the date of original PO. Freight shall be paid on pro-rata basis of respective BoQ items.**
28.	**GeM Seller ID**
	GeM seller ID is mandatory for the bidders and must be mentioned in their offer. In case at the time of submission of offer GeM seller ID is not available with bidder, then successful tenderer should ensure to have GeM Seller ID prior to award of contract. Department of Expenditure (DOE) OM no. 6/9/2020-PPD dated 24.08.2020 may be referred in this regard.
29.	**MODE OF PAYMENT**
	Payment shall be made directly to the Supplier / Contractor by BHEL through NEFT / RTGS. TBG is registered with RXIL (TReDS) platform. MSME bidders are requested to get registered with RXIL (TReDS) platform to avail the facility as per GoI guidelines.
30.	**MAKE IN INDIA (PPP-MII)**
	For this procurement, the local content to categorize a supplier as Class-I local supplier / class-II local supplier / Non-Local supplier and purchase preference to Class-I local supplier, is as defined in Public Procurement (Preference to Make in India), Order 2017 dated 04.06.2020, issued by DPIIT. In case of subsequent orders issued by the nodal ministry, changing the definition of local content for the items of the NIT, the same shall be applicable even if issued after issue of this NIT but before opening of part-II bids against this NIT. "Bidder to specify the percentage of local content as per the format of self-declaration for local content" as per Annexure-V." "This tender is not a global tender and only Class-I suppliers as defined under the DPIIT order no. P-45021/2/2017-PP (BE-II) dated 04.06.2020 are eligible to bid in this tender. Bids received from Class II & Non- Local supplier shall be rejected." The minimum local content to qualify as a Class-I local supplier is 60%.

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	Procurement under this bid is reserved for purchase from Class-I local supplier as defined in public procurement (Preference to Make in India), Order 2017 as amended from time to time and its subsequent Orders/Notifications issued by concerned Nodal Ministry for specific Goods/Products. However, eligible micro and small enterprises will be allowed to participate. In case the bid value is more than Rs.10 Crore, the declaration relating to percentage of local content shall be certified by the statutory auditor or cost auditor, if the OEM is a company and by a practicing cost accountant or a chartered accountant for OEMs other than companies as per the Public Procurement (preference to Make-in - India) order 2017 dated 04.06.2020. Purchase preference to Micro and Small Enterprises clause will get precedence over this clause.
31.	**COMPLIANCE TO GOI ORDER FOR RESTRICTIONS UNDER RULE 144 (XI) OF GENERAL FINANCIAL RULES (GFRS), 2017**
	• Any bidder from a country which shares a land border with India will be eligible to bid in any procurement whether of goods, services (including consultancy services and non-consultancy services) or works (including turnkey projects) only if the bidder is registered with the Competent Authority. Further, any bidder (including bidder from India) having specified Transfer of Technology (ToT) arrangement with an entity from a country which shares a land border with India, shall also require to be registered with the same competent authority. • "Bidder" (including the term 'tenderer', 'consultant' or 'service provider' in certain contexts) means any person or firm or company, including any member of a consortium or joint venture (that is an association of several persons, or firms or companies), every artificial juridical person not falling in any of the descriptions of bidders stated hereinbefore, including any agency branch or office controlled by such person, participating in a procurement process. • "Bidder (or entity) from a country which shares a land border with India" for the purpose of this Order means: - (a) An entity incorporated, established or registered in such a country; or (b) A subsidiary of an entity incorporated, established or registered in such a country; or (c) An entity substantially controlled through entities incorporated, established or registered in such a country; or (d) An entity whose beneficial owner is situated in such a country; or (e) An Indian (or other) agent of such an entity; or (f) A natural person who is a citizen of such a country; or (g) A consortium or joint venture where any member of the consortium or joint venture falls under any of the above. • The beneficial owner for the purpose of (iii) above will be as under: 1. In case of a company or Limited Liability Partnership, the beneficial owner is the natural person(s), who, whether acting alone or together, or through one or more juridical

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person, has a controlling ownership interest or who exercises control through other means.

Explanation-
a) "Controlling ownership interest" means ownership of or entitlement to more than twenty-five per cent. of shares or capital or profits of the company;
b) "Control" shall include the right to appoint majority of the directors or to control the management or policy decisions including by virtue of their shareholding or management rights or shareholders agreements or voting agreements;

2. In case of a partnership firm, the beneficial owner is the natural person(s) who, whether acting alone or together, or through one or more juridical person, has ownership of entitlement to more than fifteen percent of capital or profits of the partnership;

3. In case of an unincorporated association or body of individuals, the beneficial owner is the natural person(s), who, whether acting alone or together, or through one or more juridical person, has ownership of or entitlement to more than fifteen percent of the property or capital or profits of such association or body of individuals;

4. Where no natural person is identified under (1) or (2) or (3) above, the beneficial owner is the relevant natural person who holds the position of senior managing official;

5. In case of a trust, the identification of beneficial owner(s) shall include identification of the author of the trust, the trustee, the beneficiaries with fifteen percent or more interest in the trust and any other natural person exercising ultimate effective control over the trust through a chain of control or ownership.

- An Agent is a person employed to do any act for another, or to represent another in dealings with third person.

1. The successful bidder shall not be allowed to sub-contract works to any contractor from a country which shares a land border with India unless such contractor is registered with the Competent Authority

2. The registration shall be valid at the time of submission of bid and at the time of acceptance of bid.

If the bidder was validly registered at the time of acceptance/ placement of order, registration shall not be a relevant consideration during contract execution

The above clause is not applicable to the bidders from those countries (even if sharing a land border with India) to which the GoI has extended lines of credit or in which the GoI is engaged in development projects. List of countries to which lines of credit have been extended or in which development projects are undertaken are available on the Ministry of External affairs website (https://www.mea.gov.in/).

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32.	**COMPLIANCE TO ORDER NO. 25-111612018-PG, DATED 02.07.2020 OF MINISTRY OF POWER, GOI:**
	Power Supply System is a sensitive and critical infrastructure that supports not only our national defence, vital emergency services including health, disaster response, critical national infrastructure including classified data & communication services, defense installations and manufacturing establishments, logistics services but also the entire economy and the day-today life of the citizens of the country. Any danger or threat to Power Supply System can have catastrophic effects and has the potential to cripple the entire country. Therefore, the Power Sector is a strategic and critical sector. The vulnerabilities in the Power Supply System & Network mainly arise out of the possibilities of cyber-attacks through malware / Trojans etc. embedded in imported equipment. Hence, to protect the security, integrity and reliability of the strategically important and critical Power Supply System & Network in the country, the following directions are hereby issued: - 1. All equipment, components, and parts imported for use in the Power Supply System and Network shall be tested in the country to check for any kind of embedded malware/trojans/cyber threat and for adherence to Indian Standards. 2. All such testing's shall be done in certified laboratories that will be designated by the Ministry of Power (MOP). 3. Any import of equipment/components/parts from "prior reference" countries as specified or by persons owned by, controlled by, or subject to the jurisdiction or the directions of these "prior reference" countries will require prior permission of the Government of India 4. Where the equipment/components/parts are imported from "prior reference" countries, with special permission, the protocol for testing in certified and designated laboratories shall be approved by the Ministry of Power (MOP). This order shall apply to any item imported for end use or to be used as a component, or as a part in manufacturing, assembling of any equipment or to be used in power supply system or any activity directly or indirectly related to power supply system.
33.	**PREVENTION FOR CARTEL FORMATION**
	The Bidder declares that they will not enter into any illegal or undisclosed agreement or understanding, whether formal or informal with other Bidder(s). This applies in particular to prices, specifications, certifications, subsidiary contracts, submission or non-submission of bids or any other actions to restrict competitiveness or to introduce cartelization in the bidding process. In case, the Bidder is found having indulged in above activities, suitable action shall be taken by BHEL as per extant policies/ guidelines
34.	**Force Majuere**
	34.1 "Force Majeure" shall mean circumstance which is: a) beyond control of either of the parties to contract, b) either of the parties could not reasonably have provided against the event before entering into the contract,

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	c) having arisen, either of the parties could not reasonably have avoided or overcome, and d) is not substantially attributable to either of the parties And Prevents the performance of the contract, Such circumstances include but shall not be limited to: War, hostilities, invasion, act of foreign enemies. Rebellion, terrorism, revolution, insurrection, military or usurped power, or civil war. Riot, commotion or disorder by persons other than the contractor's personnel and other employees of the contractor and sub-contractors. Strike or lockout not solely involving the contractor's personnel and other employees of the contractor and sub-contractors. Encountering munitions of war, explosive materials, ionizing radiation or contamination by radio-activity, except as may be attributable to the contractor's use of such munitions, explosives, radiation or radio- activity. Natural catastrophes such as earthquake, tsunami, volcanic activity, hurricane or typhoon, flood, fire, cyclones etc. Epidemic, pandemic etc. **34.2** The following events are explicitly excluded from Force Majeure and are solely the responsibilities of the non-performing party: any strike, work-to-rule action, go-slow or similar labour difficulty late delivery of equipment or material (unless caused by Force Majeure event) and economic hardship. **34.3** If either party is prevented, hindered or delayed from or in performing any of its obligations under the Contract by an event of Force Majeure, then it shall notify the other in writing of the occurrence of such event and the circumstances thereof within 15 (fifteen) days after the occurrence of such event. **34.4** The party who has given such notice shall be excused from the performance or punctual performance of its obligations under the Contract for so long as the relevant event of Force Majeure continues and to the extent that such party's performance is prevented, hindered or delayed. The Time for Completion shall be extended by a period of time equal to period of delay caused due to such Force Majeure event. **34.5** Delay or non-performance by either party hereto caused by the occurrence of any event of Force Majeure shall not (i) Constitute a default or breach of the Contract. (ii) Give rise to any claim for damages or additional cost expense occasioned thereby, if and to the extent that such delay or non-performance is caused by the occurrence of an event of Force Majeure.

SPECIAL TERMS AND CONDITIONS FOR TENDER ENQUIRY / CONTRACT

	34.6 BHEL at its discretion may consider short closure of contract after 1 year of imposition of Force Majeure in line with extant guidelines. In any case, Supplier/Vendor cannot consider deemed short-closure after 1 year of imposition of Force Majeure.
35	**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.
36.	**Suspension of Business dealings with Suppliers**
	BHEL reserves the right to take action against Contractors who either fail to perform or Tenderers/Contractor who indulge in malpractices, by suspending business dealings with them in line with BHEL guidelines issued from time to time. The offers of the bidders who are under suspension as also the offers of the bidders, who engage the services of the banned firms / principal / agents, shall be rejected. The list of banned firms is available on BHEL web site www.bhel.com. If any bidder / supplier / contractor during pre-tendering / tendering / post tendering / award / execution / post-execution stage indulges in any act, including but not limited to, mal-practices, cheating, bribery, fraud or and other misconduct or formation of cartel so as to influence the bidding process or influence the price or tampers the tendering process or acts or omits in any manner which tantamount to an offence punishable under any provision of the Indian Penal Code, 1860 or any other law in force in India, or does anything which is actionable under the Guidelines for Suspension of Business dealings, action may be taken against such bidder / supplier / contractor as per extant guidelines of the company available on www.bhel.com and / or under applicable legal provisions. Guidelines for suspension of business dealings is available in the webpage: http://www.bhel.com/vender_registration/vender.php
	IMPORTATNT NOTE:
	BHEL shall place package and project wise separate purchase order for each project. Accordingly, Delivery period, Guarantee Period, Performance security, Liquidated Damage etc. shall be dealt separately as per project specific PO.

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Enclosures:

Sl. No.	
1.1	Special terms and conditions
1.2	General Terms and conditions
2.	Technical Specifications
3.	Price Bid format
4.	Annexure-I (A), (B) & (C)-Pre-Qualifying requirement
5.	Annexure-II-(A) to (F)- Activity Schedules
6.	Annexure-III Check List-For Bill
7.	Annexure-IV- Deleted.
8.	Annexure-V- Self-Certification for Local Content
9.	Annexure-VI- Restrictions under Rule 144 (xi) of General Financial Rules (GFRs), 2017
10.	Annexure-VII-Bidders certification regarding compliance to Rule 144 (xi) of General Financial Rules (GFRs), 2017
11.	Annexure-VIII-Bidders certification regarding compliance to Rule 144 (xi) of General Financial Rules (GFRs), 2017
12.	Annexure-IX-Order No. 25-111612018-PG, Dated 02.07.2020-MOP
13.	Annexure-X-Bidder certification regarding compliance to MOP circular
14.	Annexure-XI-Implementation of Integrity Pact IP in BHEL
15.	Annexure-XII-Format for vendor approval
16.	Annexure-XIII-Format of Security cum Performance BG
17.	Annexure-XIV-List of Banks for the Submission of Security cum Performance Bank Guarantee
18.	Annexure-XV-Contact details of bidder
19.	Annexure-XVI-Sch of Technical Dev
20.	Annexure-XVII-Sch of Commercial Dev
21.	PPP-MII-Order
22.	MRC-Format
23.	Inspection call format

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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.

Sr. No.	
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. ï 201305 1.3 In case tender enquiry is floated though 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://bheleps.buyjunction.in). 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**) ï 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** ñUn-Priced Bidò is also to be enclosed in Part-I Bid. b) **Price Bid (Part-II)** ï 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 marked

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	as ñTechno-commercial Bid (Part-I)ò and ñPrice Bid (Part-II)ò respectively. Both the envelopes are to be kept in another common envelope and marked as ñBIDò. Each envelope should be sealed and super scribed with tender enquiry no., item / package name, project name and due date of opening. Bidderôs 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 ñUn-Priced Bidò submitted with ñTechno-commercial Bid (Part-I)ò 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. c) If there is a discrepancy between words and figures, the amount in

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	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 ñBHEL/TBG/GTC-ETC/2016 Rev. 01ò 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. 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.

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	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. 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**

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	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 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

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	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 PO terms. viii) In case any shortages and / or damages in supplies, an amount calculated

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	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 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

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	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 :- Option ñAò 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. Option ñBò 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. Option ñCò 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 ñBharat Heavy Electricals Limitedò 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 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.

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	iv) Supplier has to confirm one of the applicable options for submission of PBG / Deposit before placement of PO. v) In case of nonï 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 ± 20%. Beyond this variation of ± 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 advance notice of 15 days. Supplier to ensure submission of all routine / acceptance test reports, inspection

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	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 vendorâs / supplierâs 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 Purchase Order value for supply (incl. taxes, duties, freight & insurance as applicable) of delayed lot per week of delay or part thereof subject to maximum of 10% of the total Purchase Order 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 PO /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. iii) 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 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

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	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 period of relaxation sought by bidder(s) against terms of payment in the NIT. b) Liquidated Damages (LD) for Delayed Delivery

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	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 ñThe Arbitration and Conciliation Act, 1996ò 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 representative of Supplier / Contractor and / or to surviving partners of Supplierôs / Contractorôs firm on account of cancellation of the Purchase Order / Contract. Decision of BHEL that legal representatives of deceased Supplier / Contractor or

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	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 / 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

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	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, BHELôs 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 :- i) No. of Packages ii) Size with Weight (Gross & Net) of each Package iii) No. of Containers with type & size required for inland transportation

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	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) :** MSMED 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 arrested (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 ñGuidelines for Suspension of Business Dealings with Suppliers/Contractorsò. Abridged version of same is available at BHEL website (www.bhel.com) on ñSupplier Registrationò 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 ñonline sealed bid in the Reverse Auction. Non-submission of ñonline sealed bid by the bidder will be 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

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	RA shall be sent to the bidders before conducting RA. Abridged Version of ñCommon Guidelines for Conducting Reverse Auctionòmay also be seen at BHEL website (www.bhel.com) on ñSupplier Registrationò Page & ñTender NotificationsòPage.
34.	**INTEGRITY PACT :** Bidders shall have to enter into Integrity Pact with BHEL, duly signed with seal in original, if specified in NIT / RFQ failing which bidderôs 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 Supplierôs / 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 :** 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. b) Against Supply where Erection, Testing & Commissioning (ETC) at Site is in scope of the supplier :

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	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 ± 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 ñLumpsumò 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.
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

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	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 LIMITED
TRANSMISSION PROJECTS ENGINEERING MANAGEMENT

DOCUMENT No.	TB-431-316-001A	Rev. No.	00		Prepared	Checked	Approved
TYPE OF DOC.	TECHNICAL SPECIFICATION			NAME	PC/GV	JK	VK
TITLE	765kV CIRCUIT BREAKER			SIGN			
				DATE	26.12.24	27.12.24	27.12.24
				GROUP	TBEM	W.O. No	-
CUSTOMER	POWERGRID Corporation of India Ltd (PGCIL)						

PROJECT

1. **765kV AIS Pkg SS-46T** for (a) Establishment of 765/400/220kV Barmer-I including 400kV, 2x125 MVAr Reactor; (b) Extn at 765kV Sirohi for termination of Barmer-I PS– Sirohi PS 765 kV D/c line; (c) Extn of 400kV Fatehgarh-III for termination of Fatehgarh-III (Section-2) PS – Barmer-I PS 400 kV D/c line.
2. **765kV AIS Pkg SS-47T** for (a) Establishment of 765/400/220/132kV Kurawar Substation (New) including 1x125MVAr 420kV (3-Ph)Bus Reactor, (b) Extn of 400kV Shujalpur for termination of 400kVD/C Shujalpur – Kurawar TL, (c) Extn of 400kV Ashtha S/s for LILO of one circuit of Indore-Itarsi 400 kV D/c line at Ashtha & for termination of Kurawar-Ashtha 400 kV D/c line and (d) Extn of 765kV Mandsaur for termination of Mandsaur – Kurawar 765 kV D/c line.
3. **Substation Package SS43T** for (a) Establishment of 765/400/ 220kV Mandsaur S/s and (b) Extn. of 765kV Indore (PG) for termination of Mandsaur PS – Indore (PG) 765 kV D/c Line associated with "Transmission system for evacuation of power from Rajasthan REZ Ph-IV (Part-2 : 5.5GW) Jaisalmer/Barmer Complex)Part-C"

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Rev No.	Date	Altered	Checked	Approved	REVISION DETAILS

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SECTION 1

SCOPE, SPECIFIC TECHNICAL REQUIREMENTS AND QUANTITIES

1.0 SCOPE

This technical specification covers the requirements of design, manufacture, inspection and testing at manufacturer's works, proper packing and delivery to project sites and supervision of erection, testing & commissioning of 765kV Circuit Breaker complete in all respect for efficient & trouble-free operation mentioned under this specification.

The specification comprises of following sections:

Section-1: Scope, Specific Technical Requirements & Bill of Quantities
Section-2: Equipment Specification
Section-3: Project Details & General Technical Requirements
Section-4: Guaranteed Technical Particulars
Section-5: Checklist

In case of any conflict between various sections, **order of precedence** shall be in the same order as listed above.

Note: The terms used in this specification namely, "Employer/Purchaser" refers to POWERGRID & "Contractor/Sub-contractor/manufacturer" refers to successful bidder. "GTR" refers to "section-3"

2.0 THE EQUIPMENT IS REQUIRED FOR THE FOLLOWING PROJECT

Name of Customer: POWERGRID Corporation of India Ltd (PGCIL)

Name of the Project:

1. 765/400/220kV Barmer-I (New), 765kV Sirohi(Extn.) and 400kV Fatehgarh-III (Extn.)
2. 765/400/220/132kV Kurawar (New), 400kV Shujalpur(Extn.), 400kV Ashtha (Extn.) 765kV Mandsaur (Extn.)
3. 765/400/220kV Mandsaur (New), 765kV Indore (Extn.)

Refer Section - 3 for Project Details and General Specifications

3.0 SPECIFIC TECHNICAL REQUIREMENTS

a. Technical Parameters of 765kV Circuit Breaker:

Refer Table Cl.16 of section 2 for the applicable voltage class of Circuit Breakers.

The minimum weight of the zinc coating shall be 610 gm/sq.m and minimum average thickness of coating shall be 86 microns for all items having thickness 6mm and above and **900 gm/sq.m for coastal area** (for respective site). For items lower than 6mm thickness requirement of coating thickness shall be as per relevant ASTM. For surface which shall be embedded in concrete, the zinc coating shall be 610 gm/sq.m minimum and **900 gm/sq.m for coastal area** (for respective site).

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4.0 TECHNICAL PRE-QUALIFYING REQUIREMENTS:

Refer Annexure-TQR

5.0 SUPERVISION OF ERECTION COMMISSIONING AND TESTING:

Supervision of Erection, testing and commissioning of all the supplied Circuit Breakers are in the bidder's scope. Bidder shall quote price for supervision of installation, testing and commissioning of all offered breakers. Bidder's testing engineer shall bring SF6 gas leak detector, SF6 gas filling adopter, timing kit and Transducer for operational analyzer (as per requirement).

Required unskilled man power / Labor, tools (other than special tools and tackles which shall be in bidder's scope) shall be provided by BHEL.

The measurement at site shall be carried out as per Powergrid Standard Pre-commissioning procedures as indicated in Section-2 Technical Specification. The commissioning report shall be prepared and signed by the manufacturer's representative.

Following Instruments shall be made available by BHEL to testing engineer.
a) DCRM (Operational analyzer) Kit
b) 5kV Insulation tester
c) 1kV Insulation tester
d) Single phase variac
e) Dew Point meter
f) Capacitance and Tan Delta Kit
g) Contact Resistance measurement kit
h) Multimeter

Any other instrument(s), if required for Testing/commissioning of Circuit Breaker shall be arranged by bidder. Cost of the same shall be deemed inclusive in the offer.

The respective dates of commencement of erection, testing and commissioning activities by BHEL will be intimated to the equipment manufacturer from time to time, so that arrangements for supervising the activity can be made accordingly by the manufacturer. Bidder to note that erection, testing and commissioning of all of the supplied breakers shall not be done in one go. Multiple visits shall be required.

6.0 BILL OF QUANTITES:

Refer Annexure-1 BOQ- BARMER (New) & SIROHI (Extn.)
Refer Annexure-2 BOQ- KURAWAR (New) & MANDSAUR (Extn.)
Refer Annexure-3 BOQ- MANDSAUR & INDORE

7.0 TYPE TEST:

a. All equipment being supplied shall conform to type tests as per technical specification and shall be subject to routine tests in accordance with requirements stipulated under respective sections.

b. The reports for all type tests as per technical specification shall be furnished by the bidder along with equipment / material drawings. However, type test reports of similar

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equipments/ material already accepted in POWERGRID shall be applicable for all project with similar requirement. The type tests conducted earlier 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 POWERGRID or representative authorized by POWERGRID or Utility or representative of accredited test lab or reputed consultant or representative of The National Accreditation Board for Certification Bodies (NABCB) certified agency shall also be acceptable.

Unless otherwise specified elsewhere, the type test reports submitted shall be of the tests conducted within the 10 years from date of 20.01.2025. In case the test reports are of the test conducted earlier than the years specified from the date 20.01.2025, the bidder shall repeat these test(s) at no extra cost to the Employer.

Further, in the event of any discrepancy in the test reports i.e. any test report not acceptable due to any design/manufacturing changes (including substitution of components) or due to non-compliance with the requirement stipulated in the Technical Specification or any/all type tests not carried out, same shall be carried out without any additional cost and delivery implication to the Purchaser/Employer.

The bidder shall intimate the BHEL/POWERGRID the detailed program about the tests at least two (2) weeks in advance in case of domestic supplies & six (6) weeks in advance in case of foreign supplies.

The Employer reserves the right to witness any or all the type tests. The Employer shall bear all expenses for deputation of Employer's representative(s) for witnessing the type tests except in the case of re-deputation if any, necessitated due to no fault of the Employer.

8.0 SPECIAL TOOLS AND TACKLES:

Bidder shall supply all special tools and tackle (other than maintenance tools as if mentioned in BOQ) which are specifically required for Circuit Breakers and are proprietary in nature. Cost of the same shall be deemed inclusive in the offer for main item. List of such special tools and tackle should be clearly listed along with the technical offer. Any special tool which is not listed in the technical spec / bid but required during the erection/commissioning of Circuit Breakers shall also be supplied by the bidder without time / cost implication.
In case, special tools and tackles which is proprietary in nature is not required for Erection/testing/commissioning or for smooth operation of Circuit Breaker, bidder has to submit a certificate mentioning that no special tools and tackles is required for Circuit Breakers.

9.0 PACKING:

9.1 All equipments shall be suitably protected, coated, covered or boxed and crated to prevent damage or deterioration during transit, handling and outdoor storage (for a minimum period of 6 months) at site till the time of erection. While packing all the materials, the limitations from the point of view of availability of transportation facilities in India should be considered. The Bidder shall be responsible for any loss or damage during transportation, handling and storage.

9.2 The Bidder shall include and provide for security, protection and packing the equipment so as to avoid loss or damage during transport by any mode.

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9.3 All packing shall allow for easy removal and checking at site. Wherever necessary, proper arrangement for attaching slings for lifting shall be provided. All packages shall be clearly marked for with signs showing 'UP' and 'DOWN' side of boxes, and handling and unpacking instructions as considered necessary. Special precautions shall be taken to prevent rusting of steel and iron parts during transit and storage. Gas seals or other methods proposed to be adopted for protection against moisture during transit shall be to the satisfaction of the purchaser.

9.4 The cases containing easily damageable material shall be very carefully packed and marked with appropriate caution symbols i.e. FRAGILE, HANDLE WITH CARE, USE NO HOOKS etc.

9.5 Each package delivered under the contract shall be marked by the Bidder at his expense and such marking must be distinct (all previous irrelevant marking being carefully obliterated). Such marking shall show the description and quantity of contents, the name of consignee and address, the gross and net weights of the package, the name of Bidder with a distinctive number of mark sufficient for purpose of identification. All markings shall be carried out with such materials as to ensure quickness of drying, fastness and legibility.

9.6 Each Package shall contain a note quoting specifically the name of the Bidder, the number and date of contract or order and the name of office placing the contract, nomenclature of the stores and include a schedule of parts for each complete equipment giving the parts number with reference to the General Arrangement/ Assembly drawing and the quantity of each part, drawing number and tag numbers.

9.7 All equipment/ material shall be suitably packed for transport, carriage at site and outdoor storage during transit. The Bidder shall be responsible for any damage to the equipment during transit. The contents of each package shall bear marking that can be readily identified from the package list and packing shall provide complete protection from moisture, termites and mechanical shocks etc.

9.8 Any material found short inside the packing cases shall be supplied by the Bidder without any extra cost.

9.9 Notwithstanding anything stated in this clause the Bidder shall be entirely responsible for any loss, damage or depreciation to the stores.

10.0 DEVIATIONS:

The bidder shall list all the deviation from the specification separately. Offers without specific deviation will be deemed to be totally in compliance with the specification and NO DEVIATION on any account will be entertained at a later date.

11.0 MANUFACTURING QUALITY PLAN:

Bidder should have POWERGRID approved and valid quality plan at contract stage. In case bidder don't have POWERGRID approved Quality plan, it will be bidder's responsibility to get its quality plan approved directly POWERGRID

12.0 DRAWINGS and SCHEME:

The documentation requirements detailed under Section-2 and 3 shall be submitted to BHEL

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at various stages of contract. Softcopy of the drawings and schemes are to be submitted at contract stage. Preparation of AS- BUILT drawings is also in the scope of the bidder.

Date of Submission of first lot of drawings will be counted only from the date of reasonably correct drawings. List of drawings required for technical clearance of manufacturing are as follows:

1. Approved GTP
2. Approved GA.
3. Approved Type Test Reports

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ANNEXURE-1 BOQ – BARMER-I (NEW) & SIROHI (EXTN.) (SS46T)

BOQ for BARMER-I (NEW) S/s and SIROHI (EXTN.)

SN	Item Description	UOM	Qty		Remarks
			Barmer	Sirohi	
1	SUPPLY- CIRCUIT BREAKER: 765KV, 50KA FOR 1S, 25MM/KV CREEPAGE, 3150A 3 PHASE CIRCUIT BREAKER WITHOUT PIR WITH CONTROL SWITCHING CAPABILITY ALONGWITH SUPPORT STRUCTURE, INTERPOLE CABLES, OPERATING MECHANISM, CONTROL BOXES AND ALL ACCESSORIES COMPLETE IN ALL RESPECT	Nos.	7	-	
2	SUPPLY- CIRCUIT BREAKER: 765KV, 50KA FOR 1S, 25MM/KV CREEPAGE, 3150A 3 PHASE CIRCUIT BREAKER WITH PIR WITH CONTROL SWITCHING CAPABILITY ALONGWITH SUPPORT STRUCTURE, INTERPOLE CABLES, OPERATING MECHANISM, CONTROL BOXES AND ALL ACCESSORIES COMPLETE IN ALL RESPECT	Nos.	4	3	
3	SUPPLY- CIRCUIT BREAKER : 765KV, 50KA FOR 1S, 25MM/KV CREEPAGE, 3150A 3 PHASE CIRCUIT BREAKER WITHOUT PIR WITH CONTROL SWITCHING CAPABILITY ALONGWITH SUPPORT STRUCTURE, INTERPOLE CABLES, OPERATING MECHANISM, CONTROL BOXES AND ALL ACCESSORIES COMPLETE IN ALL RESPECT SUITABLE FOR 1-PHASE REACTOR SWITCHING	Nos.	2	2	
4	SUPPLY- CIRCUIT BREAKER : 765KV, 50KA FOR 1S, 25MM/KV CREEPAGE, 3150A 1 PHASE CIRCUIT BREAKER WITHOUT PIR WITH CONTROL SWITCHING CAPABILITY ALONGWITH SUPPORT STRUCTURE, INTERPOLE CABLES, OPERATING MECHANISM, CONTROL BOXES AND ALL ACCESSORIES COMPLETE IN ALL RESPECT SUITABLE FOR 1-PHASE REACTOR SWITCHING	Nos.	1	1	
5	SUPPLY- CIRCUIT BREAKER : 765KV, CONTROLLED SWITCHING DEVICE FOR 3-PH CIRCUIT BREAKER	Nos.	11	2	
6	SUPPLY- CIRCUIT BREAKER: SPECIAL CABLES FOR CB / CSD / RP INTERFACING. MODE OF MEASUREMENT SHALL BE CABLE-TRENCH RUNNING LENGTH FROM CIRCUIT BREAKER TO CSD/ RELAY PANEL	MTR	2750	500	
7	SUPPLY- CIRCUIT BREAKER : 765KV, FOUNDATION BOLTS FOR CIRCUIT BREAKER, PLATFORM AND LADDER	Set	40	19	1 Set equivalent to 1 phase of CB.
8	SUPPLY- CIRCUIT BREAKER : TRANSDUCERS / FIXTURES REQUIRED FOR TRAVEL MEASUREMENT OF COMPLETE 3-PHASE CB	Set	1	1	
9	SUPPLY- CIRCUIT BREAKER : SF6 GAS FILLING ADOPTER, INCLUDING COUPLING, REGULATOR, CONNECTING HOSE PIPE UP TO GROUND LEVEL	Lot	1	1	
10	SPARES- COMPLETE POLE (1-PHASE) OF CIRCUIT BREAKER INCLUDING GRADING CAPACITOR (IF APPLICABLE), POLE COLUMN, INTERRUPTER, OPERATING MECHANISM, MARSHALLING BOX, CORONA RING (IF APPLICABLE) BUT WITHOUT CLOSING RESISTOR AND SUPPORT STRUCTURE (765KV, 3150A, 50KA FOR 1 SEC)	Nos.	1	-	
11	SPARES- COMPLETE POLE (1-PHASE) OF CIRCUIT BREAKER INCLUDING GRADING CAPACITOR (IF APPLICABLE), POLE COLUMN, INTERRUPTER, OPERATING MECHANISM, MARSHALLING BOX, CORONA RING (IF APPLICABLE) WITH CLOSING RESISTOR BUT WITHOUT SUPPORT STRUCTURE (765KV, 3150A, 50KA FOR 1 SEC)	Nos.	1	-	

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12	SPARES- GRADING CAPACITORS FOR 1-PH OF 765KV SF6 CIRCUIT BREAKER	Nos.	2	-	
13	SPARES- RUBBER GASKET "O RING" AND SEALS (COMPLETE REPLACEMENT FOR 1-PHASE OF 765KV BREAKER)	Set	1	-	
14	SPARES- TRIP COILS WITH RESISTOR (AS APPLICABLE)	Set	2	-	Of each type and rating
15	SPARES- CLOSING COILS WITH RESISTOR (AS APPLICABLE)	Set	2	-	Of each type and rating
16	SPARES- TERMINAL PAD AND CONNECTOR (ONE NO OF EACH TYPE)	Set	2	-	
17	SPARES- MOLECULAR FILTER	Nos.	2	-	
18	SPARES- CORONA RINGS (IF APPLICABLE)	Nos.	2	-	
19	SPARES- RELAY, POWER CONTACTORS, SWITCH FUSE UNITS, LIMIT SWITCHES FUSE UNITS, LIMIT SWITCHES, PUSH BUTTONS, TIMERS & MCB ETC (1 NO OF EACH TYPE)	Set	1	-	
20	SPARES- PRESSURE SWITCH OF EACH TYPE	Set	1	-	
21	SPARES- AUXILIARY SWITCH ASSEMBLY	Set	1	-	Of each type and rating
22	SPARES- OPERATION COUNTER	Nos.	1	-	
23	SPARES- COMPLETE DRIVE MECHANISM	Set	1	-	Of each type and rating
24	SPARES- SF6 GAS (EQUIVALENT TO 2 POLES)	Lot	1	-	
25	SERVICES- CIRCUIT BREAKER : 765KV, SUPERVISION OF ERECTION, TESTING AND COMMISSIONING OF CIRCUIT BREAKER	Nos.	13	6	For 3- Phase CB
26	SERVICES- CIRCUIT BREAKER: 765KV, SUPERVISION OF ERECTION, TESTING AND COMMISSIONING OF 1 PHASE CIRCUIT BREAKER WITHOUT PIR SUITABLE FOR 1-PHASE REACTOR SWITCHING.	Nos.	1	1	For 1- Phase CB
27	SERVICES- CIRCUIT BREAKER : 765KV, SUPERVISION OF ERECTION, TESTING AND COMMISSIONING OF CONTROLLED SWITCHING DEVICE FOR 3 PHASE CIRCUIT BREAKER	Nos.	11	2	

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ANNEXURE-2 BOQ - KURAWAR (NEW) & MANDSAUR (EXTN.) (SS47T)

BOQ for KURAWAR (NEW) S/s and MANDSAUR (EXTN.)

SN	Item Description	UOM	Qty		Remarks
			Kurawar	Mandsaur	
1	SUPPLY- CIRCUIT BREAKER: 765KV, 50KA FOR 1S, 25MM/KV CREEPAGE, 3150A 3 PHASE CIRCUIT BREAKER WITHOUT PIR WITH CONTROL SWITCHING CAPABILITY ALONGWITH SUPPORT STRUCTURE, INTERPOLE CABLES, OPERATING MECHANISM, CONTROL BOXES AND ALL ACCESSORIES COMPLETE IN ALL RESPECT	Nos.	8	-	
2	SUPPLY- CIRCUIT BREAKER: 765KV, 50KA FOR 1S, 25MM/KV CREEPAGE, 3150A 3 PHASE CIRCUIT BREAKER WITH PIR WITH CONTROL SWITCHING CAPABILITY ALONGWITH SUPPORT STRUCTURE, INTERPOLE CABLES, OPERATING MECHANISM, CONTROL BOXES AND ALL ACCESSORIES COMPLETE IN ALL RESPECT	Nos.	4	4	
3	SUPPLY- CIRCUIT BREAKER : 765KV, 50KA FOR 1S, 25MM/KV CREEPAGE, 3150A 3 PHASE CIRCUIT BREAKER WITHOUT PIR WITH CONTROL SWITCHING CAPABILITY ALONGWITH SUPPORT STRUCTURE, INTERPOLE CABLES, OPERATING MECHANISM, CONTROL BOXES AND ALL ACCESSORIES COMPLETE IN ALL RESPECT SUITABLE FOR 1-PHASE REACTOR SWITCHING	Nos.	2	2	
4	SUPPLY- CIRCUIT BREAKER : 765KV, 50KA FOR 1S, 25MM/KV CREEPAGE, 3150A 1 PHASE CIRCUIT BREAKER WITHOUT PIR WITH CONTROL SWITCHING CAPABILITY ALONGWITH SUPPORT STRUCTURE, INTERPOLE CABLES, OPERATING MECHANISM, CONTROL BOXES AND ALL ACCESSORIES COMPLETE IN ALL RESPECT SUITABLE FOR 1-PHASE REACTOR SWITCHING	Nos.	2	1	
5	SUPPLY- CIRCUIT BREAKER : 765KV, CONTROLLED SWITCHING DEVICE FOR 3-PH CIRCUIT BREAKER	Nos.	10	2	
6	SUPPLY- CIRCUIT BREAKER: SPECIAL CABLES FOR CB / CSD / RP INTERFACING. MODE OF MEASUREMENT SHALL BE CABLE-TRENCH RUNNING LENGTH FROM CIRCUIT BREAKER TO CSD/ RELAY PANEL	MTR	2500	500	
7	SUPPLY- CIRCUIT BREAKER : 765KV, FOUNDATION BOLTS FOR CIRCUIT BREAKER, PLATFORM AND LADDER	Set	44	19	1 Set equivalent to 1 phase of CB.
8	SUPPLY- CIRCUIT BREAKER : TRANSDUCERS / FIXTURES REQUIRED FOR TRAVEL MEASUREMENT OF COMPLETE 3-PHASE CB	Set	1	1	
9	SUPPLY- CIRCUIT BREAKER : SF6 GAS FILLING ADOPTER, INCLUDING COUPLING, REGULATOR, CONNECTING HOSE PIPE UP TO GROUND LEVEL	Lot	1	1	
10	SPARES- COMPLETE POLE (1-PHASE) OF CIRCUIT BREAKER INCLUDING GRADING CAPACITOR (IF APPLICABLE), POLE COLUMN, INTERRUPTER, OPERATING MECHANISM, MARSHALLING BOX, CORONA RING (IF APPLICABLE) BUT WITHOUT CLOSING RESISTOR AND SUPPORT STRUCTURE (765KV, 3150A, 50KA FOR 1 SEC)	Nos.	1	1	
11	SPARES- COMPLETE POLE (1-PHASE) OF CIRCUIT BREAKER INCLUDING GRADING CAPACITOR (IF APPLICABLE), POLE COLUMN, INTERRUPTER, OPERATING MECHANISM, MARSHALLING BOX, CORONA RING (IF APPLICABLE) WITH CLOSING RESISTOR BUT WITHOUT SUPPORT STRUCTURE (765KV, 3150A, 50KA FOR 1 SEC)	Nos.	1	1	

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12	SPARES- GRADING CAPACITORS FOR 1-PH OF 765KV SF6 CIRCUIT BREAKER	Nos.	2	2	
13	SPARES- RUBBER GASKET "O RING" AND SEALS (COMPLETE REPLACEMENT FOR 1-PHASE OF 765KV BREAKER)	Set	1	1	
14	SPARES- TRIP COILS WITH RESISTOR (AS APPLICABLE)	Set	2	2	Of each type and rating
15	SPARES- CLOSING COILS WITH RESISTOR (AS APPLICABLE)	Set	2	2	Of each type and rating
16	SPARES- TERMINAL PAD AND CONNECTOR (ONE NO OF EACH TYPE)	Set	2	2	
17	SPARES- MOLECULAR FILTER	Nos.	2	2	
18	SPARES- CORONA RINGS (IF APPLICABLE)	Nos.	2	2	
19	SPARES- RELAY, POWER CONTACTORS, SWITCH FUSE UNITS, LIMIT SWITCHES FUSE UNITS, LIMIT SWITCHES, PUSH BUTTONS, TIMERS & MCB ETC (1 NO OF EACH TYPE)	Set	1	1	
20	SPARES- PRESSURE SWITCH OF EACH TYPE	Set	1	1	
21	SPARES- AUXILIARY SWITCH ASSEMBLY	Set	1	1	Of each type and rating
22	SPARES- OPERATION COUNTER	Nos.	1	1	
23	SPARES- COMPLETE DRIVE MECHANISM	Set	1	1	Of each type and rating
24	SPARES- SF6 GAS (EQUIVALENT TO 2 POLES)	Lot	1	1	
25	SERVICES- CIRCUIT BREAKER : 765KV, SUPERVISION OF ERECTION, TESTING AND COMMISSIONING OF CIRCUIT BREAKER	Nos.	14	6	For 3-Phase CB
26	SERVICES- CIRCUIT BREAKER: 765KV, SUPERVISION OF ERECTION, TESTING AND COMMISSIONING OF 1 PHASE CIRCUIT BREAKER WITHOUT PIR SUITABLE FOR 1-PHASE REACTOR SWITCHING.	Nos.	2	1	For 1-Phase CB
27	SERVICES- CIRCUIT BREAKER : 765KV, SUPERVISION OF ERECTION, TESTING AND COMMISSIONING OF CONTROLLED SWITCHING DEVICE FOR 3 PHASE CIRCUIT BREAKER	Nos.	10	2	

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ANNEXURE-3 BOQ - MANDSAUR & INDORE (SS43T)

BOQ for MANDSAUR(NEW) and INDORE(EXTN.)

SN	Item Description	UOM	Qty		Remarks
			Mandsaur	Indore	
1	SUPPLY- CIRCUIT BREAKER: 765KV, 50KA FOR 1S, 25MM/KV CREEPAGE, 3150A 3 PHASE CIRCUIT BREAKER WITHOUT PIR WITH CONTROL SWITCHING CAPABILITY ALONGWITH SUPPORT STRUCTURE, INTERPOLE CABLES, OPERATING MECHANISM, CONTROL BOXES AND ALL ACCESSORIES COMPLETE IN ALL RESPECT	Nos.	5	-	
2	SUPPLY- CIRCUIT BREAKER: 765KV, 50KA FOR 1S, 25MM/KV CREEPAGE, 3150A 3 PHASE CIRCUIT BREAKER WITH PIR WITH CONTROL SWITCHING CAPABILITY ALONGWITH SUPPORT STRUCTURE, INTERPOLE CABLES, OPERATING MECHANISM, CONTROL BOXES AND ALL ACCESSORIES COMPLETE IN ALL RESPECT	Nos.	7	4	
3	SUPPLY- CIRCUIT BREAKER : 765KV, 50KA FOR 1S, 25MM/KV CREEPAGE, 3150A 3 PHASE CIRCUIT BREAKER WITHOUT PIR WITH CONTROL SWITCHING CAPABILITY ALONGWITH SUPPORT STRUCTURE, INTERPOLE CABLES, OPERATING MECHANISM, CONTROL BOXES AND ALL ACCESSORIES COMPLETE IN ALL RESPECT SUITABLE FOR 1-PHASE REACTOR SWITCHING	Nos.	2	-	
4	SUPPLY- CIRCUIT BREAKER: 765KV, 50KA FOR 1S, 25MM/KV CREEPAGE, 3150A 1 PHASE CIRCUIT BREAKER WITHOUT PIR WITH CONTROL SWITCHING CAPABILITY ALONGWITH SUPPORT STRUCTURE, INTERPOLE CABLES, OPERATING MECHANISM, CONTROL BOXES AND ALL ACCESSORIES COMPLETE IN ALL RESPECT SUITABLE FOR 1-PHASE REACTOR SWITCHING	Nos.	1	-	
5	SUPPLY- CIRCUIT BREAKER : 765KV, CONTROLLED SWITCHING DEVICE FOR 3-PH CIRCUIT BREAKER	Nos.	10	2	
6	SUPPLY- CIRCUIT BREAKER: SPECIAL CABLES FOR CB / CSD / RP INTERFACING. MODE OF MEASUREMENT SHALL BE CABLE-TRENCH RUNNING LENGTH FROM CIRCUIT BREAKER TO CSD/ RELAY PANEL	MTR	2500	500	
7	SUPPLY- CIRCUIT BREAKER : 765KV, FOUNDATION BOLTS FOR CIRCUIT BREAKER, PLATFORM AND LADDER	Set	43	12	1 Set equivalent to 1 phase of CB
8	SUPPLY- CIRCUIT BREAKER : TRANSDUCERS / FIXTURES REQUIRED FOR TRAVEL MEASUREMENT OF COMPLETE 3-PHASE CB	Set	1	1	
9	SUPPLY- CIRCUIT BREAKER : SF6 GAS FILLING ADOPTER, INCLUDING COUPLING, REGULATOR, CONNECTING HOSE PIPE UP TO GROUND LEVEL	Lot	1	1	
10	SERVICES- CIRCUIT BREAKER : 765KV, SUPERVISION OF ERECTION, TESTING AND COMMISSIONING OF CIRCUIT BREAKER	Nos.	14	4	For 3 Phase CB
11	SERVICES- CIRCUIT BREAKER: 765KV, SUPERVISION OF ERECTION, TESTING AND COMMISSIONING OF 1 PHASE CIRCUIT BREAKER WITHOUT PIR SUITABLE FOR 1-PHASE REACTOR SWITCHING.	Nos.	1	-	For 1 Phase CB
12	SERVICES- CIRCUIT BREAKER : 765KV, SUPERVISION OF ERECTION, TESTING AND COMMISSIONING OF CONTROLLED SWITCHING DEVICE FOR 3 PHASE CIRCUIT BREAKER	Nos.	10	2	

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Notes for above BOQs –

1. The above quantities may vary ± 25%.
2. Prices for all applicable accessories & hardware of Circuit Breakers shall be included in the equipment prices.
3. Respective dates for the commencement of erection, testing and commissioning activities of Circuit Breakers shall be communicated to manufacturers from time to time as per the readiness of respective sites. Bidder to note that erection, testing and commissioning of all of the supplied breakers shall not be done one go. Multiple visits shall be required.
4. For Item of Foundation bolt, Platform and ladder in above BOQ , 1 Set is defined as total qty required for each phase of Circuit Breaker. In case of addition/deletion of any Circuit Breaker, this item shall be dealt on pro data basis.
5. **For CSD Cable, Per meter price should consist of required no. of cable runs, i.e. price for per meter of multiple runs. Average distance between circuit breaker mechanism box to CSD located in relay panel is taken as 250 m per breaker. Total length of the cable should be decided by bidder considering above distance and required no. of runs. Cable shall be provided with single drum length after confirmation by BHEL during detailed engineering. Sensors, timers, relay gland and lugs etc. shall be in bidder scope. If special cable is not required, vendor to quote normal cable as required.

6. **Additional Requirements:**
   i. All cables within & between circuit breaker poles and its marshalling box and up to the controlled switching device shall be in bidder's scope of supply. Cable shall be provided with single drum length considering all circuit breakers. Necessary glands and lugs to be provided. Bidder to provide detailed "Bill of Quantity" during detailed engineering stage.
   ii. Cabling & termination schedule for the same shall be provided by successful bidder along with AS MANUFACTURED drawing during contract stage.
   iii. TB's for incoming AC Power Cables shall be suitable for size (minimum) 4Cx16 sq. mm. Al.
   iv. LED luminaries/light is to be provided as per technical requirement (minimum 7 watt).
   v. Following minimum accessories are clarified as bidder's scope of supply
      - **Structure** for Equipment support, Ladder & Platform etc.
      - **Foundation bolts** for Circuit Breaker, CB ladder, CB Platform, common control cubicle.
      - **Cable Tray** arrangement to be mounted on Breaker structure.
      - Breaker **Terminal pad**.
   vi. Following are not in bidder's scope of supply (BHEL supplied items)
      - Terminal Connectors.

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SECTION-2

Refer Technical Specification, Section: Switchgear-CB, REV.11 C/ENGG/SPEC/SWGR/CB, DEC-2016 **with additional requirement as mentioned in attached section-2**

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TECHNICAL SPECIFICATION SECTION: SWITCHGEAR-CB REVISION-11

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SPECIFIC REQUIREMENT

C.	Section Switchgear – CB Rev 11	
1.	**Clause no. 2.6 Para 2**	The CSD shall be provided in following circuit breakers: d) 765kV • Main and Tie bay for Auto Transformer • Main and Tie bay of Bus Reactor • Switchable Line Reactor bay e) 400kV • Main and Tie bay for 765/400kV Auto Transformer • Main and Tie bay of Bus Reactor • Switchable Line Reactor bay f) 220 & 132kV • Bay for operation of Shunt reactor The requirement of CSD shall be explicitly specified in price schedule.
2.	**New Clause no. 2.6.1(n)**	For Circuit breaker with CSD controlling a Transformer following is applicable “The limit for inrush current for switching of Transformer by CSD shall be 1.0 p.u. of rated current of transformer after fine tuning of CSD settings during pre-commissioning checks. For site acceptance of CSD, during online CSD test after fine tuning inrush current should be less than 1.0 P.U. of rated current in five consecutive operations”.
3.	**Clause No. 11.4**	Separate cables shall be used for AC, DC-I, DC-II and selected DC. **Each control cable shall include minimum 10% spare cores (subject to minimum 1 no. of spare core).**
4.	**Clause No. 11.5**	Requirement of Plug-In type connector for Inter-pole cabling is deleted
5.	**Clause No. 11.6**	Vertical run of cables to the operating mechanism box shall be properly supported by providing the perforated closed type galvanized cable tray (Cable tray also to be supplied along with the Circuit Breaker) to be fixed as an integral part of the structures. The load of the cable shall not be transferred to the mechanism box/terminal arrangement in any circumstances. Hanging or loose run of cable is not permitted. The drawing of cable tray including fixing arrangement shall be incorporated in the GA drawing of CB also.

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6.	**Clause No. 16.0 S.No. 20 (i)**	**Parameter**	**765kV system**	**400kV system**	**220kV system**	**132 kV system**	**66kV System**	
		Pre-insertion resistor requirement	As per BPS	As per BPS	NA	NA	NA	
		Rating (ohms)	Approx. 450 with tolerance as applicable	Approx. 400 with tolerance as applicable	NA	NA	NA	

Summary of major changes made in this revision w.r.t earlier Technical Specification, Section: Switchgear, Chapter-CB, Rev.10A & Section: Switchgear, Chapter 765kV CB, Rev.02

1) Technical specification, Section: Switchgear, Chapter 765kV CB, Rev.02 and Section: Switchgear, Chapter CB, Rev.10A are merged to prepare this combined technical specification section up to 765kV CB.

2) All 765kV & 400kV Circuit Breaker control schematics shall be finalized in such a way, that it may operate with or without CSD (refer clause 1.6)

3) Some duty requirements parameters added/modified (refer clause 2.0)

4) SF6 gas for main CBs shall be supplied in returnable cylinders (refer clause 5.0)

5) Insulators for Circuit breakers can be of Porcelain/polymer type (refer clause 6.0)

6) Included Indicative platform & ladder drawing for 400kV&765kV CB (refer clause 9.0)

7) Included Plug-in type arrangement for termination of inter pole cables (refer clause 11.0)

8) Included Technical parameters for 72.5kV CB (refer clause 16.0)

9) Some parameters like dielectric, creepage, seismic requirement etc w.r.t CBs are included (refer clause 16.0)

10) Included Actions required for defects observed during defect liability period (refer clause 18.0)

Note:
Changes made in this document are shown with bold letters, further major changes are listed above; however for complete details of changes, please refer the complete technical specification, Section: Switchgear-CB, REV.11

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SECTION: SWITCHGEAR–CB (CIRCUIT BREAKER)

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SECTION: SWITCHGEAR–CB (CIRCUIT BREAKER)

1.0 GENERAL

1.1 The circuit breakers and accessories shall conform to IEC: 62271-100, IEC: 62271-1 and other relevant IEC standards except to the extent explicitly modified in the specification and shall also be in accordance with requirements specified in Section-GTR.

1.2 800/420/245/145/**72.5**kV circuit breakers offered would be of sulphur hexafluoride (SF6) type and of class C2-M2 as per IEC. The bidder may offer circuit breakers of either live tank type or dead tank type of proven design.

1.3 The circuit breaker shall be complete with operating mechanism, **common marshalling box**, piping, inter-pole cables, cable accessories like glands, terminal blocks, marking ferrules, lugs, pressure gauges, density monitors (with graduated scale), galvanised support structure, **platform with ladder** for CB, their foundation bolts and all other accessories required for carrying out all the functions of the CB.

All necessary parts to provide a complete and operable circuit breaker installation such as terminal pads, control parts and other devices shall be provided.

1.4 Painting shall be done in line with Section – GTR. **Paint shade RAL-7032** or similar shades can be used for painting. The support structure, **platform & ladder** of circuit breaker shall be hot dip galvanised. Exposed hardware items shall be hot dip galvanised or Electro-galvanised.

1.5 The circuit breakers shall be designed for use in the geographic and meteorological conditions as given in Section-**Project**.

1.6 **All 765kV & 400kV Circuit Breaker control schematics shall be finalized in such a way, that it may operate with or without CSD by using a suitable selector switch irrespective of whether circuit breakers to be supplied are envisaged along with CSD or not as per bid price schedules.**

2.0 DUTY REQUIREMENTS

2.1 The circuit breakers shall be capable of performing their duties without opening resistors.

2.2 The circuit breaker shall meet the duty requirements for any type of fault or fault location **and** also for line switching when used on effectively grounded system and perform make and break operations as per the stipulated duty cycles satisfactorily.

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2.2.1 PRE-INSERTION RESISTER

800kV & 420kV circuit breakers shall be provided with single step pre-insertion closing resistors **(wherever the requirement of PIR is explicitly specified in bid price schedules)** to limit the switching surges. The resistance value of pre-insertion resistor and the duration of pre-insertion time **is** given in clause **16.0** of this section. The resistor shall have thermal rating for the following duties:

i) TERMINAL FAULT

Close .... 1 Min .... Open Close Open…..2 min ..... Close ..... 1 Min ..... Open Close Open.

ii) RECLOSING AGAINST TRAPPED CHARGES

Duty shall be the same as under (i) above. The first, third and fourth closures are to be on de - energised line while second closing is to be made with lines against trapped charge of 1.2 p.u. of opposite polarity.

iii) OUT OF PHASE CLOSING

One closing operation under phase opposition, that is with twice the voltage across the terminals.

iv) No allowance shall be made for heat dissipation of resistor during time interval between successive closing operations. The resistors and resistor supports shall perform all these duties without deterioration. Test reports of resistors proving thermal rating for duties specified above shall be furnished during detailed engineering. The calculations shall be provided to take care of the effect of tolerances on resistance values and insertion time.

2.3 The breaker shall be capable of:

i) Interrupting the steady and transient magnetizing current corresponding to Power transformers as follows:

Voltage rating of CB	**Type of Transformer**	**Rating (in MVA)**
800kV	**765/400kV**	**250 to 1500**
420kV	**765/400kV**	**250 to 1500**
	400/220kV	**250 to 630**
	400/132kV	**160 to 315**
245kV	**400/220kV**	**200 to 630**
	220/132kV	**50 to 200**

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	220/66kV	**50 to 200**
145kV	**220/132kV**	**50 to 200**
	132/33kV	**10 to 50**

ii) Interrupting line/cable charging current as per IEC without use of opening resistors. **The breaker shall be able to interrupt the rated line charging current as per IEC-62271-100 with test voltage immediately before opening equal to the product of U/√3 and 1.4**

iii) Clearing short line fault (kilometric faults) with source impedance behind the bus equivalent to symmetrical fault current specified.

iii) Breaking 25% of the rated fault current at twice rated voltage under phase opposition condition.

i**v) Withstanding all dielectric stresses imposed on it in open condition at lock out pressure continuously (i.e. shall be designed for 2 p.u. across the breaker continuously, for validation of which a power frequency withstand test conducted for a duration of at least 15 minutes is acceptable).**

v) Circuit breakers shall be able to switch in and out the shunt reactor as detailed below:

Voltage rating of CB	**Reactor Rating (in MVAR)**	**Max. rise of over voltage (in p.u.)**
800kV	**150 to 330**	**1.9**
420kV	**50 to 150**	**2.3**
245kV	**25 to 50**	**2.3**

a. Capability of 400 kV circuit breakers to interrupt inductive current below 100 A without giving rise to overvoltage more than 2.3 p.u. (As specified in IEC-62271-110) shall be validated by carrying out the simulation study/analysis (EMTP/PSCAD) by modeling an equivalent circuit comprising all circuit component i.e. Inductance of Shunt Reactor, Stray capacitance of Shunt Reactor, Circuit Breaker, Stray capacitance of Bus Connection, Capacitance of grading Capacitor, inductance of neutral grounding reactor, Network Thevenin's equivalent, any other series/parallel inductance/capacitance connected to simulate the actual inductive load switching.

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b. Current chopping capability (chopping number) of circuit breaker as per IEC-62271-306 to be figured out from actual Laboratory test and / or field test report and same Current chopping capability (chopping number) shall be used in above said simulation study/analysis.

c. To validate the results of above said simulation study/analysis report, the same study shall be carried out for capability of tested circuit breaker and the study/analysis results shall be comparable with actual Laboratory test and / or field test reports.

d. Laboratory test/ field test reports shall be submitted for 400 kV CBs in case there is change in design including change in following:

i. Different short circuit current capability

ii. Different model/type

vi) The breakers shall also withstand the voltages specified under clause **16.0** of this section.

2.6 CONTROLLED SWITCHING DEVICE (CSD) :

Circuit Breakers shall be equipped with controlled switching **device** with consequent optimization of switching behavior, when used in:

- Switching of transformer **(from 765kV and 400kV side circuit breakers only)**
- Switching of shunt Reactor

The CSD shall be provided in Circuit breaker of switchable line reactor **bay** and in Main & Tie **bay** circuit breakers of Transformers, line with non-switchable line reactors and Bus reactors. **The CSD shall be supplied as per bid price schedules.**

2.6.1 Technical Requirement for controlled switching device:

a) The CSD shall be designed to operate correctly and satisfactorily with the excursion of auxiliary A/C & DC voltages and frequency as specified in section - GTR.

b) The CSD shall meet the requirements **of IEC-61000-4-16 class IV** for HF disturbance test **(for short and long durations both)** and fast transient test shall be as per **IEC-61000-4-4 level IV** and insulation test as per IEC 60255–5.

c) The CSD shall have functions for switching ON & OFF the circuit breakers.

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d) The CSD shall get command to operate the breakers manually. The controller shall be able to analyze the current and voltage waves available through the signals from secondaries of CTs & CVTs for the purpose of calculation of optimum moment of the switching the circuit breaker and issue command to circuit breaker to operate.

e) The CSD shall also have an adaptive control feature to consider the next operating time of the breaker in calculation of optimum time of issuing the switching command. In calculation of next operating time of the breaker, the CSD must consider all factors that may affect the operating time of the breaker such as, but not limited to, ambient temperature, control voltage variation, SF6 gas density variations etc. Schematic drawing for this purpose shall be provided by the contractor. The accuracy of the operating time estimation by the controller shall be better than **± 0.5 ms.**

f) The CSD should have display facility at the front for the display of settings and measured values.

g) The CSD shall be PC compatible for the setting of various parameters and down loading of the settings and measured values, date, time of switching etc. Window based software for this purpose shall be supplied by the contractor to be used on the owner's PC.

h) The controller shall be suitable for current input of 1 ampere from the secondary of the CTs. and 110 V (Ph to Ph) from the CVTs. The CSD shall **withstand** transient and dynamic state values of the current from the secondary of the CTs and CVTs.

i) The CSD shall have time setting resolution of 0.1 ms or better.

j) The CSD shall have sufficient number of output/input potential free contacts for connecting the monitoring equipment and annunciation system available in the control room. Necessary details shall be worked out during engineering of the scheme.

k) The CSD shall also record and monitor the switching operations and make adjustments to the switching instants to optimize the switching behavior as necessary. It shall provide self-diagnostic facilities, signaling of alarms and enable downloading of data captured from the switching events.

l) The provision for bypassing the Controlled switching device shall be provided through BCU and SCADA both **so that whenever, the CSD is not healthy due to any reason (including auxiliary supply failure), uncontrolled trip/close command can be extended to the circuit**

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Breaker. Alternatively, in case of any non-operation of the CSD after receiving a close/trip command after a pre-determined time delay, the CSD should automatically be bypassed so as to ensure that the trip and close commands are extended to the Trip/Close coils **through subsequent command.**

m) The CSD shall be provided with a communication port to facilitate online communication of the CSD with Substation automation system directly on IEC 61850 protocols. If the CSD does not meet the protocols of IEC 61850, suitable gateway shall be provided to enable the communication of CSD as per IEC 61850.

3.0 TOTAL BREAK TIME

3.1 The total break time as specified under this section shall not be exceeded under any of the following duties:

i) Test duties T10, T30, T60, T100a, and T100s (with TRV as per IEC: 62271-100)

ii) Short line fault L75, L90 (with TRV as per IEC: 62271-100)

3.2 The total break time of the breaker shall not be exceeded under any duty conditions specified such as with the combined variation of the trip coil voltage (70-110%), arc extinguishing medium pressure etc. While furnishing the proof of the total break time of complete circuit breaker, the effect of non-simultaneity between contacts within a pole or between poles **shall be brought out to establish** guaranteed total break time.

3.3 The values guaranteed shall be supported with the type test reports.

4.0 CONSTRUCTIONAL FEATURES

The features and constructional details of circuit breakers shall be in accordance with requirements stated hereunder:

4.1 Contacts

4.1.1 The gap between the open contacts shall be such that it can withstand at least the rated phase to ground voltage for 8 hours at zero gauge pressure of SF6 gas due to the leakage. The breaker should be able to withstand all dielectric stresses imposed on it in open condition at lock out pressure continuously (i.e. 2 p.u. across the breaker continuously, for validation of which a power frequency dielectric with stand test conducted for a duration of at least 15 minutes is acceptable).

4.2 If multi-break interrupters are used, these shall be so designed and augmented that a uniform voltage distribution is developed across them. Calculations/

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test reports in support of the same shall be furnished. The thermal and voltage withstand rating of the grading elements shall be adequate for the service conditions and duty specified.

4.3 The SF6 Circuit Breaker shall meet the following additional requirements:

a) The circuit breaker shall be single pressure type. The design and construction of the circuit breaker shall be such that there is a minimum possibility of gas leakage and entry of moisture. There should not be any condensation of SF6 gas on the internal insulating surfaces of the circuit breaker.

b) All gasketted surfaces shall be smooth, straight and reinforced, if necessary, to minimise distortion and to make a tight seal, the operating rod connecting the operating mechanism to the arc chamber (SF6 media) shall have adequate seals. The SF6 gas leakage should not exceed 0.5% per year and the leakage rate shall be guaranteed **during the warrantee period**. In case the leakage under the specified conditions is found to be greater than 0.5% **per** year **after** commissioning of circuit breaker **during the warrantee period**, the manufacturer will have to supply free of cost, the total gas requirement for subsequent ten (10) years, based on actual leakage observed during **the warrantee period**.

c) In the interrupter assembly there shall be an absorbing product box to minimise the effect of SF6 decomposition products and moisture. The material used in the construction of the circuit breakers shall be fully compatible with SF6 gas decomposition products.

d) Each pole shall form an enclosure filled with SF6 gas independent of two other poles (for 800, 420 & 245 kV CBs) and the SF6 density of each pole shall be monitored individually. For CBs of voltage class of 145 kV or less, a common SF6 scheme/density monitor shall be acceptable.

e) The dial type SF6 density monitor shall be adequately temperature compensated to model the pressure changes due to variations in ambient temperature within the body of circuit breaker as a whole. **Separate density monitor and dial type temperature compensated pressure guage is also acceptable.** The density monitor shall have graduated scale and it shall be possible to dismantle the density monitor for checking/replacement without draining the SF6 gas by providing suitable interlocked non return valve coupling.

f) Circuit Breaker shall be capable of withstanding a vacuum of minimum 8 millibars without distortion or failure of any part.

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g) Sufficient SF6 gas **(including that will be required for gas analysis during filling)** shall be provided to fill all the circuit breakers **being supplied.** Spare gas shall be supplied in separate unused cylinders as per requirement specified in **BPS.**

4.4 Provisions shall be made for attaching an operational analyser to record contact travel, speed and making measurement of operating timings, pre insertion timings of closing resisters if used, synchronisation of contacts in one pole.

4.5 **The CO (Close-open) operation and its timing shall be such as to ensure complete travel/insertion of the contact during closing operation and then follow the opening operation.**

5.0 SULPHUR HEXAFLUORIDE GAS (SF6 GAS)

a) The SF6 gas shall comply with IEC 60376 and shall be suitable in all respects for use in the switchgear under the operating conditions.

b) The high pressure cylinders in which the SF6 gas is shipped and stored at site shall comply with requirements of the relevant standards and regulations. **SF6 gas shall be supplied (in returnable cylinders) for all circuit breakers. However, SF6 gas for spare circuit breakers and mandatory spare quantity of SF6 gas shall be supplied in non-returnable cylinders.**

c) Test: SF6 gas shall be tested for purity, dew point, air, **hydro-soluble** fluorides and water content as per IEC 60376 and test certificates shall be furnished to Employer indicating all the tests as per IEC 60376 for each lot of SF6 gas and Material safety datasheet shall be provided. Gas bottles should be checked for leakage during receipt at site.

6.0 INSULATORS

a) The porcelain**/polymer** of the insulators shall conform to the requirements stipulated under Section-GTR.

b) The mechanical characteristics of insulators shall match with the requirements specified under this section.

c) All **porcelain & polymer** hollow **column** insulators shall conform to IEC-62155 & **IEC-61462 respectively.**

d) Hollow Porcelain**/polymer** for pressurised columns/chambers should be in one integral piece in green and fired stage.

7.0 SPARE PARTS AND MAINTENANCE EQUIPMENT

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The bidder shall include in his proposal, spare parts and maintenance equipment in accordance with BPS. Calibration certificates of each maintenance equipment shall be supplied along with the equipment.

8.0 OPERATING MECHANISM AND CONTROL

8.1 General Requirements

8.1.1 **Circuit breaker shall be operated by spring charged mechanism. The mechanism box shall meet the requirements of IP-55.**

8.1.2 The operating mechanism **box** shall be strong, rigid, **rebound free and shall be readily accessible for maintenance**.

8.1.3 The mechanism shall be anti-pumping and trip free under every method of closing.

8.1.4 The mechanism shall be such that the failure of any auxiliary spring will not prevent tripping and will not cause **unwanted** trip or closing operation of the Circuit Breaker

8.1.5 A mechanical indicator shall be provided to show open and close position of the breaker. It shall be located in a position where it will be visible to a man standing on the ground level with the mechanism housing closed. An operation counter shall also be provided in the **common marshalling box**.

8.1.6 Working parts of the mechanism shall be of corrosion resisting material, bearings which require grease shall be equipped with pressure type grease fittings. Bearing pin, bolts, nuts and other parts shall be adequately pinned or locked to prevent loosening or changing adjustment with repeated operation of the breaker.

8.1.7 The **contractor** shall furnish detailed operation and maintenance manual of the mechanism alongwith the operation manual for the circuit breaker. The instruction manuals shall contain exploded diagrams with complete storage, handling, erection, commissioning, troubleshooting, servicing and overhauling instructions.

8.1.8 Size of common marshalling Box shall be such that adequate space is available for working in the panel and all wiring shall be routed through non-inflammable wire troughs with covers.

8.1.9 Space shall be available in 765kV CB common marshalling box to mount monitoring device, of about 300x300x150mm size and of approximately 7kg weight, by the owner in future.

8.1.10 Operating mechanism and Marshalling box should be provided with space heater with thermostat, CFL/LED lamp and AC point /Socket.

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8.2 **Control:**

8.2.1 The close and trip circuits shall be designed to permit use of momentary contact switches and push buttons.

8.2.2 Each breaker shall be provided with two (2) independent tripping circuits, pressure switches and coils each to be fed from separate DC sources.

8.2.3 The breaker shall normally be operated by remote electrical control. Electrical tripping shall be performed by shunt trip coils. However, provisions shall be made for local electrical control. For this purpose a local/remote selector switch and close and trip control switch/push buttons shall be provided in the Breaker **common marshalling box**.

8.2.4 The trip coils shall be suitable for trip circuit supervision during both open and close position of breaker.

8.2.5 Closing coil and associated circuits shall operate correctly at all values of voltage between 85% and 110% of the rated voltage. Shunt trip coil and associated circuits shall operate correctly under all operating conditions of the circuit breaker up to the rated breaking capacity of the circuit breaker and at all values of supply voltage between 70% and 110% of rated voltage. However, even at 50% of rated voltage the breaker shall be able to open. If additional elements are introduced in the trip coil circuit their successful operation and reliability for similar applications on outdoor circuit breakers shall be clearly brought out during detailed engineering.

8.2.6 The 765kV kV, 3-Phase circuit breakers suitable for single phase switching shall be suitable for taking a spare pole into service in case of any operational requirement and their marshalling box shall be suitable for accommodating the additional relays etc. required for changeover arrangement of all contacts, alarms, signals, indications, interlocks and lockouts.

8.2.7 In trip and closing circuits, relays/relay contacts shall preferably be used instead of contactors.

8.2.8 Controlled switching scheme/device, wherever required shall be considered as integral part of CB and shall be commissioned along with CB.

8.2.9 Density Monitor contacts and pressure switch contacts shall be **preferably** suitable for direct use as permissive in closing and tripping circuits. **The devices shall provide continuous & automatic monitoring of the state of the gas as follows:**

a) 'Gas Refill' level

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This contact will be used for remote indication/ to annunciate the need for gas refilling.

b) 'SF6 gas density Low' Alarm level - 1
This contact will be used for remote indication/ to annunciate the need for the urgent gas refilling.

c) 'SF6 gas density Low' Alarm level - 2
This contact will be used to annunciate the need for gas refilling under emergency or trip the Circuit Breaker.

d) 'Breaker Block' level
This is the minimum gas density at which the manufacturer will guarantee the rated fault interrupting capability of the breaker. At this level the breaker block contact shall operate & the tripping & closing circuit shall be blocked.

It shall be possible to test all gas monitoring relays/devices without de-energizing the primary equipment & without reducing pressure in the main section. Plugs & sockets shall be used for test purposes. It shall also damp the pressure pulsation while filling the gas in service, so that flickering of the pressure switch contacts does not take place.

The density monitor shall be placed suitably inclined in such a way so that the readings are visible from ground level with or without using binoculars. Separate contacts have to be used for each of tripping and closing circuits. If contacts are not suitably rated and multiplying relays are used then fail safe logic/schemes are to be employed. DC supplies for all auxiliary circuits shall be monitored and provision shall be made for remote annunciations and operation lockout in case of D.C. failures. Density monitors are to be so mounted that the contacts do not change on vibration during operation of circuit Breaker.

8.2.10 The auxiliary switch of the breaker shall be positively driven by the breaker operating rod.

8.3 **Spring operated mechanism:**

a) Spring operated mechanism shall be complete with motor **as per manufacturer practice**. Opening spring and closing spring with limit switch for automatic charging and other necessary accessories to make the mechanism a complete operating unit shall also be provided.

b) As long as power is available to the motor, a continuous sequence of the closing and opening operations shall be possible. The motor shall have adequate thermal rating for this duty.

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c) After failure of power supply to the motor one close open operation shall be possible with the energy contained in the operating mechanism.

d) Breaker operation shall be independent of the motor which shall be used solely for compressing the closing spring. Facility for manual charging of the closing spring shall also be provided. The motor rating shall be such that it requires not more than 30 seconds for full charging of the closing spring.

e) Closing action of circuit breaker shall compress the opening spring ready for tripping.

f) When closing springs are discharged after closing a breaker, closing springs shall be automatically charged for the next operation and an indication of this shall be provided in the local and remote control cabinet.

g) Provisions shall be made to prevent a closing operation of the breaker when the spring is in the partial charged condition. Mechanical interlocks shall be provided in the operating mechanism to prevent discharging of closing springs when the breaker is already in the closed position.

h) The spring operating mechanism shall have adequate energy stored in the operating spring to close and latch the circuit breaker against the rated making current and also to provide the required energy for the tripping mechanism in case the tripping energy is derived from the operating mechanism.

i) **The spring charging failure alarm shall be provided with a time delay relay having setting range from 0-1minute.**

j) **Separate MCBs shall be provided for each spring charging motor and the rating of MCBs shall be suitably selected to match the starting, running and stalling time.**

k) **An overload relay shall be provided for protection of the spring charging motor.**

9.0 SUPPORT STRUCTURE

a) The structure design shall be such that during operation of circuit breaker vibrations are reduced to minimum.

b) **Ladder and Maintenance platform for 400kV and 765kV Circuit breaker:**

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A suitable ladder with the safety cage and a free standing maintenance platform with railing for each pole of the circuit breaker shall be supplied along with the equipment and it's support structure. The platform shall be suitable for maintenance personnel to stand and carryout the activities along with the tools and plant.
The ladder cum maintenance platform shall be designed as a free standing structure without taking any support from the main circuit breaker structure. The ladder having height more than 3.0m shall have at least 15 degree slope and is to be provided with safety guard above 2.0m level. All structural steel for the platform shall be as per IS: 2062 and to be galvanized. An indicative drawing of ladder and platform (Drg.Ref.: C-ENGG-IND.DWG-PLATFORM-CB, Rev.0) is added at page 27 of 27 with this specification for guidance which may be modified to suit the requirement of CB by CB manufacturer. However, the minimum size of the structural members shall be maintained as mentioned in the drawing.

c) **For 220kV, 132kV & 66kV circuit breakers a suitable platform cum ladder shall be provided as per manufacturer design.**

10.0 TERMINAL CONNECTOR PAD

The circuit breaker terminal pads shall be made up of high quality electrolytic copper or aluminium and shall be conforming to Australian Standard AS-2935 **or equivalent standard** for rated current. The terminal pad shall have protective covers which shall be removed before interconnections.

11.0 INTER-POLE CABLING

11.1 All cables to be used by contractor shall be armoured and shall be as per IS – 1554/ IEC-60502 (1100 Volts Grade). All cables within & between circuit breaker poles and its marshaling box and up to the controlled switching device is included in the scope of work. Special cables like screened cable if required for Circuit Breaker, **temperature Transducer/CB Status Signals for CSD** and its associated C&R panel shall be laid in 50mm diameter PVC pipe. Suitable supports for PVC pipe shall be included in the scope of Supply.

11.2 Only stranded conductor shall be used. Minimum size of the conductor for inter-pole control wiring shall be 1.5 sq.mm. Copper.

11.3 The cables shall be with oxygen index Minimum 29 and temperature index as $250^{o}C$ as per relevant standards.

11.4 **Separate cables shall be used for AC, DC-I, DC-II and selected DC.**

11.5 **All inter-pole cabling of Circuit breakers and up to common marshalling box shall be done by plug-in type arrangement. Suitable removable type**

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encasing cover shall be provided in case plug-in type connection arrangement is provided exterior side of LCC/MB. The plug-in type cable termination shall be conforming to IP-67 as per IEC60529. Cable sealing arrangement shall be provided (as per requirement) to avoid entry of moisture etc.

11.6 **Vertical run of cables to the operating mechanism box shall be properly supported by providing the perforated closed type galvanized cable tray (Cable tray also to be supplied along with the Circuit Breaker) to be fixed as an integral part of the structures. The load of the cable shall not be transferred to the mechanism box/plug-in type terminal arrangement in any circumstances. Hanging or loose run of cable is not permitted. The drawing of cable tray including fixing arrangement shall be incorporated in the GA drawing of CB also.**

11.7 **Wiring** shall be done with stud type terminals and ring type lugs. More than two wires shall not be connected on each side of terminal.

12.0 FITTINGS AND ACCESSORIES

12.1 Following is **list of** some of the major fittings and accessories to be furnished by Contractor in the **common marshalling box**. Number and exact location of these parts shall be indicated **in the drawing**.

i) Cable glands (Double compression type), Lugs, Ferrules etc.

ii) Local/remote changeover switch.

iii) Operation counter

iv) Control switches to cut off control power supply.

v) Fuses/**MCBs** as required.

vi) The number of terminals provided shall be adequate enough to wire out all contacts and control circuits plus 24 terminals spare for future use.

vii) Anti-pumping relay.

viii) Pole discrepancy relay (for electrically ganged CBs).

ix) D.C. Supervision relays.

x) Rating plate description in accordance with IEC incorporating year of manufacture.

xi) Controlled switching **accessories** like sensors, timers, relays etc.(as applicable)

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xii) **Transducers/Fixtures required for travel measurement shall be supplied by CB manufacturer. The complete set of Transducers/Fixtures for measurement of complete 3-phase CB shall be supplied for each station. Further, one set of gas filling adopter (Including coupling, regulator, connecting hose pipe up to ground level) shall be supplied as per BPS.**

13.0 ADDITIONAL DATA TO BE FURNISHED

a) Drawing, showing contacts in close, arc initiation, full arcing, arc extinction and open position.

b) The temperature v/s pressure curves for each setting of density monitor along with details of density monitor.

c) Method of checking the healthiness of voltage distribution devices (condensers) provided across the breaks at site.

d) Data on capabilities of circuit breakers in terms of time and number of operations at duties ranging from 100% fault currents to load currents of the lowest possible value without requiring any maintenance or checks.

e) **Maximum** non-simultaneity between contacts, between poles and **effect of the same on the** guaranteed total break time.

f) Sectional view of non-return couplings used for SF6 pipes.

g) Details & type of filters used in interrupter assembly and also the operating experience with such filters.

h) Details of SF6 gas:

   i) The test methods used in controlling the quality of gas used in the circuit breakers particularly purity and moisture content.

   ii) Proposed tests to assess the conditions of the SF6 within a circuit breaker after a period of service particularly with regard to moisture contents of the gas.

j) Shall furnish curves supported by test data indicating the opening time under close open operation with combined variation of trip coil voltage.

k) Detailed literature and schematic diagrams of switching mechanism for closing resistor showing the duration of insertion shall also be furnished alongwith the calculations in respect of thermal rating of resistors for the duties specified under clause **2.2.1** of this section in case of 420 kV **& 800kV** circuit breakers.

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l) All duty requirements as applicable to 800 kV, 420 kV, 245 kV, 145 kV & 72.5kV CBs specified under Clause **2.0** of this section shall be provided with the support of adequate test reports.

14.0 DEAD TANK TYPE CIRCUIT BREAKER

14.1 In case dead tank type circuit breaker is offered, the Bidder shall offer bushing type CTs (whose secondary parameters are given in under **Section: Switchgear-Instrument Transformer** and in case of 765kV and 400kV these secondaries shall be provided in sets of 3 cores, i.e., 2 cores of PX class and one core of metering, on both sides of dead tank circuit breaker instead of conventional outdoor CTs.

14.2 The enclosure shall be made of either Al/Al Alloy or mild steel (suitably hot dip galvanized). The enclosure shall be designed for the mechanical and thermal loads to which it is subjected in service. The enclosure shall be manufactured and tested according to the pressure vessel codes {i.e., latest edition of the ASME code for pressure vessel - Section VIII of BS-5179, IS4379, IS-7311 (as applicable) and also shall meet Indian Boiler Regulations}.

The maximum temperature of enclosure with CB breaker carrying full load current shall not exceed the ambient by more than 20 deg C.

14.3 The enclosure has to be tested as a routine test at 1.5 times the design pressure for one minute. A bursting pressure test shall be carried out at 5 times the design pressure as type test on the enclosure.

15.0 TESTS

15.1 In accordance with the requirements stipulated under Section-GTR the circuit breaker alongwith its operating mechanism shall conform to **the type tests as per** IEC: 62271-100.

15.2 The type test reports **as per IEC** and the following additional type test reports shall also be submitted for purchaser's/**employer's** review:

i) Corona extinction voltage test (**procedure** as per Annexure-A of Section-GTR).

ii) Out of phase closing test as per IEC: 62271-100.

iii) Line charging interrupting current for proving parameters as per clause no. **16.0** of this section.

iv) Test to demonstrate the Power Frequency withstand capability of breaker in open condition at Zero Gauge pressure and at lockout pressure (Ref. Clause 4.1.1).

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$ For Low & High temperature type test, Field performance report of CB's as per IEC 62271-100 revision 2008 (covering amendment-2 in 2017) is also acceptable as valid Type test report.

Applicable for :
1. Barmer-Sirohi package and,
2. Kurawar-Mandsaur package

v) Seismic withstand test **(procedure** as per Annexure-B of Section-GTR) in unpressurised condition.

vi) Verification of the degree of protection.

$ **vii) Low temperature test (applicable only for minimum ambient temperatures of less than (-) 10 deg.C application purpose) and High temperature test. Contractor can also submit the field performance report in line with IEC stipulations.**

Applicable For Mandsaur - Indore package

viii) Static Terminal Load test.

ix) Critical Currents test (if applicable).

x) Switching of Shunt Reactors. **Test reports shall be submitted as per IEC. Calculations shall be submitted for meeting the requirements of clause 2.3(v) of this section.**

xi) Circuit breakers meant for controlled switching shall conform to requirements of IEC/TR-62271 – 302. The contractor shall submit test reports to demonstrate that the offered CB conforms to the requirements of performance verification tests and parameter definition tests as per IEC/TR 62271-302. The contractor shall also furnish the report for the re-ignition free arcing window for switching 3-phase shunt reactor as demonstrated in the shunt reactor switching test.

15.3 **Routine Tests**

Routine tests as per IEC:62271-100 shall be performed on all circuit breakers.

In addition to the mechanical and electrical tests specified by IEC, the following tests shall also be performed.

i) Speed curves for each breaker shall be obtained with the help of a suitable operation analyzer to determine the breaker contact movement during opening, closing, auto reclosing and trip free operation under normal as well as limiting operating **control voltage conditions**. The tests shall show the speed of contacts directly at various stages of operation, travel of contacts, opening time, closing time, shortest time between separation and meeting of contacts at break make operation etc. This test shall also be performed at site for which the necessary operation analyzer along with necessary transducers, cables, console etc. shall be **arranged by the contractor at his own cost**.

ii) **During testing of CB, dynamic contact resistance measurement (DCRM) shall be carried out for close-open (CO) operations with delay of 300ms between close and trip operations. Minimum 100A**

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current shall be injected for DCRM test. Travel characteristics, injected current, trip/close coil current shall also be recorded along with DCRM test.

iii) **Routine tests on Circuit breakers with Controlled switching device as per IEC/TR 62271-302.**

iv) **Tan delta and Capacitance measurement for grading capacitors at rated voltage and also at 10kV (for reference).**

16.0 TECHNICAL PARAMETERS FOR CIRCUIT BREAKER

(In addition to those indicated in section-GTR)

Sl. no.	Parameter	765kV system	400kV system	220kV system	132 kV system	66 kV system
1.	Rated voltage (Umax) kV (rms)	800	420	245	145	72.5
2.	Rated frequency (Hz)	50	50	50	50	50
3.	No. of poles	3	3	3	3	3
4.	Type of circuit breaker	SF6 gas insulated	SF6 gas insulated	SF6 gas insulated	SF6 gas insulated	SF6 gas insulated
5.	Rated continuous current (A) at an ambient temperature of 50^0C	3150/4000	2000/3150/ 4000 (as applicable)	1600/2500 (as applicable)	1250	1250
6.	Rated short circuit capacity with percentage of DC component as per IEC-62271-100 corresponding to minimum opening time under operating conditions specified.	50kA (As applicable)	40/50/63kA (As applicable)	40/50 kA (As applicable)	31.5kA	25kA
7.	Symmetrical interrupting capability kA (rms)	50	40/50/63 (As applicable)	40/50 (As applicable)	31.5	25
8.	Rated short circuit making current kAp	125	100/125/ 157.5 (As applicable)	100/125 (As applicable)	80	63
9.	Short time current carrying capability kA (rms)	50 for one second	40/50/63 As applicable for one second	40/50 As applicable for one second	31.5 for one second	25 for three second
10.	Out of phase breaking current carrying capability kA (rms)	12.5	10/12.5/15.75 (As applicable)	**As per IEC**	**As per IEC**	**As per IEC**
11.	Rated line charging interrupting current at 90 deg. Leading power factor angle (A rms) (The breaker shall be able to interrupt the rated line charging current with test voltage immediately before	900	600	As per IEC	As per IEC	As per IEC

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	opening equal to the product of U/√3 and 1.4 as per IEC-62271-100					
12.	First pole to clear factor	1.3	1.3	1.3	1.3	1.5
13.	Temperature rise over an ambient temperature of 50^0C	As per IEC: 62271-100	As per IEC: 62271-100	As per IEC: 62271-100	As per IEC: 62271-100	As per IEC: 62271-100
14.	Rated break time as IEC (ms)	40	40	60	60	Less than 75
15.	Total break time (ms)	45	45	65	65	Less than 80
16.	Total closing time (ms)	Not more than 150	Not more than 150	Not more than **150**	Not more than **150**	Not more than **150**
17.	Operating mechanism or a combination of these	Spring	Spring	Spring	Spring	Spring
18.	Rated operating duty cycle	O-0.3s-CO-3 min-CO	O-0.3s-CO-3 min-CO	O-0.3s-CO-3 min-CO	O-0.3s-CO-3 min-CO	O-0.3s-CO-3 min-CO
19.	Reclosing	Single phase &Three phase auto reclosing.	Single phase &Three phase auto reclosing.	Single phase &Three phase auto reclosing.	Three phase auto reclosing. (Single phase auto reclosing if specified in section-project)	Three phase auto reclosing.
20.	Pre-insertion resistor requirement	As per BPS	As per BPS	NA	NA	NA
i)	Rating (ohms)	450(max.) with tolerance as applicable	400(max.) with tolerance as applicable	NA	NA	NA
ii)	Minimum electrical (mechanical insertion time +pre-arcing time) pre-insertion time (ms)	9	8	NA	NA	NA
iii)	Opening of PIR contacts	PIR contacts should open immediately after closing of main contacts OR At least 5 ms prior to opening of main contacts at rated air/gas pressure where the	PIR contacts should open immediately after closing of main contacts OR At least 5 ms prior to opening of main contacts at rated air/gas pressure where the	NA	NA	NA

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		PIR contacts remain closed	PIR contacts remain closed			
21.	Max. difference in the instants of closing/opening of contacts (ms) between poles at rated control voltage and rated operating & quenching media pressures	2.5(within a pole) 3.3(opening) 5.0(closing)	2.5(within a pole) 3.3(opening) 5.0(closing)	3.3(opening) 5.0(closing)	3.3(opening) 3.3(closing)	As per IEC
22.	Maximum allowable switching over voltage under any switching condition	1.9 p.u.	2.3 p.u.	As per IEC	As per IEC	As per IEC
23.	Trip coil and closing coil voltage with variation as specified	220V DC	220V DC	220V DC	220V DC or 110V DC	220V DC or 110V DC
24.	Noise level at base and up to 50 m distance from base of circuit breaker	As per IEC	140dB (max.)	140dB (max.)	140dB (max.)	140dB (max.)
25.	Rating of Auxiliary contacts	10A at 220V DC	10A at 220V DC	10A at 220V DC	10A at 220V DC	10A at 220V DC
26.	Breaking capacity of Aux. Contacts	2A DC with circuit time constant not less than 20ms	2A DC with circuit time constant not less than 20ms	2A DC with circuit time constant not less than 20ms	2A DC with circuit time constant not less than 20ms	2A DC with circuit time constant not less than 20ms
27.	**Rated insulation levels**					
i)	Full wave impulse withstand (1.2 /50 µs) between line terminals and ground	±2100kVp	±1425 kVp	±1050 kVp	±650 kVp	±325 kVp
ii)	Full wave impulse withstand (1.2 /50 µs) between terminals with circuit breaker open	2100kVp impulse on one terminal & 455 kVp power frequency voltage of opposite polarity on the other terminal	1425 kVp impulse on one terminal & 240 kVp power frequency voltage of opposite polarity on the other terminal	±1050 kVp	+ 650kVp	±325 kVp
iii)	Rated switching impulse withstand voltage (250/2500 µs) Dry & wet between line terminals and ground	+ 1550kVp	+1050 kVp .	NA	NA	NA
iv)	Rated switching impulse withstand voltage (250/2500 µs) Dry &wet Between terminals with circuit breaker open	1175kVp impulse on one terminal & 650 kVp power frequency	900 kVp impulse on one terminal & 345 kVp power frequency	NA	NA	NA

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		voltage of opposite polarity on the other terminal	voltage of opposite polarity on the other terminal			
v)	One minute power frequency dry withstand voltage between line terminals and ground	830kV rms	520 kV rms.	460 kV rms.	275 kV rms	140 kV rms
vi)	One minute power frequency dry withstand voltage between terminals with circuit breaker open	1150kV rms	610 kV rms.	460 kV rms.	275 kV rms	160 kV rms
28.	Minimum corona extinction voltage with CB in all positions	508 kV rms	320kV rms	156 kV rms	92 kV rms	NA
29.	Max. radio interference voltage for frequency between 0.5 MHz and 2 MHz (Micro volts)	2500 µV (at 508kV rms)	1000 µV (at 266kV rms)	1000 µV (at 156kV rms)	500µV (at 92kV rms)	NA
30.	Minimum Creepage distance*					
i)	Phase to ground (25mm/kV)	20000mm	10500mm	6125mm	3625mm	1813mm
ii)	Between CB terminals	18000mm	10500mm	6125mm	3625mm	1813mm
31.	System neutral earthing	Effectively earthed				
32.	Rated terminal load	As per IEC or as per the value calculated based on specific switchyard layout requirement, whichever is higher.				
33.	Auxiliary contacts	Besides requirement of technical specification, the manufacturer/contractor shall wire up 10 NO + 10 NC contacts exclusively for purchaser's use and wired up to common marshalling box.				
34.	No. of terminals in common marshalling box	All contacts & control circuits to be wired out up to common marshalling box + minimum 24 terminals exclusively for purchaser's future use				
35.	Seismic level	0.5g horizontal for the site location under the Zone-V as per IS-1893 0.3g horizontal for the site location under other than the Zone-V as per IS-1893				

*** The values indicated are for specific creepage of 25mm/kV. In case of specific creepage of 31mm/kV specified, the Minimum Creepage distance values shall be concidered proportionately.**

17.0 PRE-COMMISSIONING TESTS

17.1 An indicative list of tests is given below. All routine tests except power frequency voltage dry withstand test on main circuit breaker shall be repeated on the completely assembled breaker at site. For Pre-commissioning tests, procedures and formats for circuit breakers, POWERGRID document no. CF/CB/03/R-4 dated 01/04/2013 of document no. D-2-01-03-01-04 dated 01-04-2013 will be the reference document. This document will be available at respective sites and shall be referred by the contractor. Contractor shall perform any additional test based on specialties of the items as per the field Q.P./instructions of the equipment Supplier or Employer without any extra cost to the Employer. The Contractor

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shall arrange all instruments required for conducting these tests alongwith calibration certificates and shall furnish the list of instruments to the Employer for approval.

(a) Insulation resistance of each pole.

(b) Check adjustments, if any suggested by manufacturer.

(c) Breaker closing and opening time.

(d) Slow and Power closing operation and opening.

(e) Trip free and anti pumping operation.

(f) Minimum pick-up voltage of coils.

(g) Dynamic Contact resistance measurement.

(h) Functional checking of control circuits interlocks, tripping through protective relays and auto reclose operation.

(i) Insulation resistance of control circuits, motor etc.

(j) Resistance of closing and tripping coils.

(k) SF6 gas leakage check.

(l) Dew Point Measurement

(m) Operation check of pressure switches and gas density monitor during gas filling.

(n) Checking of mechanical 'CLOSE' interlock, wherever applicable.

(o) Testing of grading capacitor.

(p) Resistance measurement of main circuit.

(q) Checking of operating mechanisms

(r) Check for annunciations in control room.

(s) Point of wave switching test (wherever applicable)

17.2 The contractor shall ensure that erection, testing and commissioning of circuit breaker shall be carried out under the supervision of the circuit breaker manufacturer's representative. The commissioning report shall be signed by the manufacturer's representative.

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18.0 ACTIONS REQUIRED FOR DEFECTS OBSERVED DURING DEFECT LIABILITY PERIOD

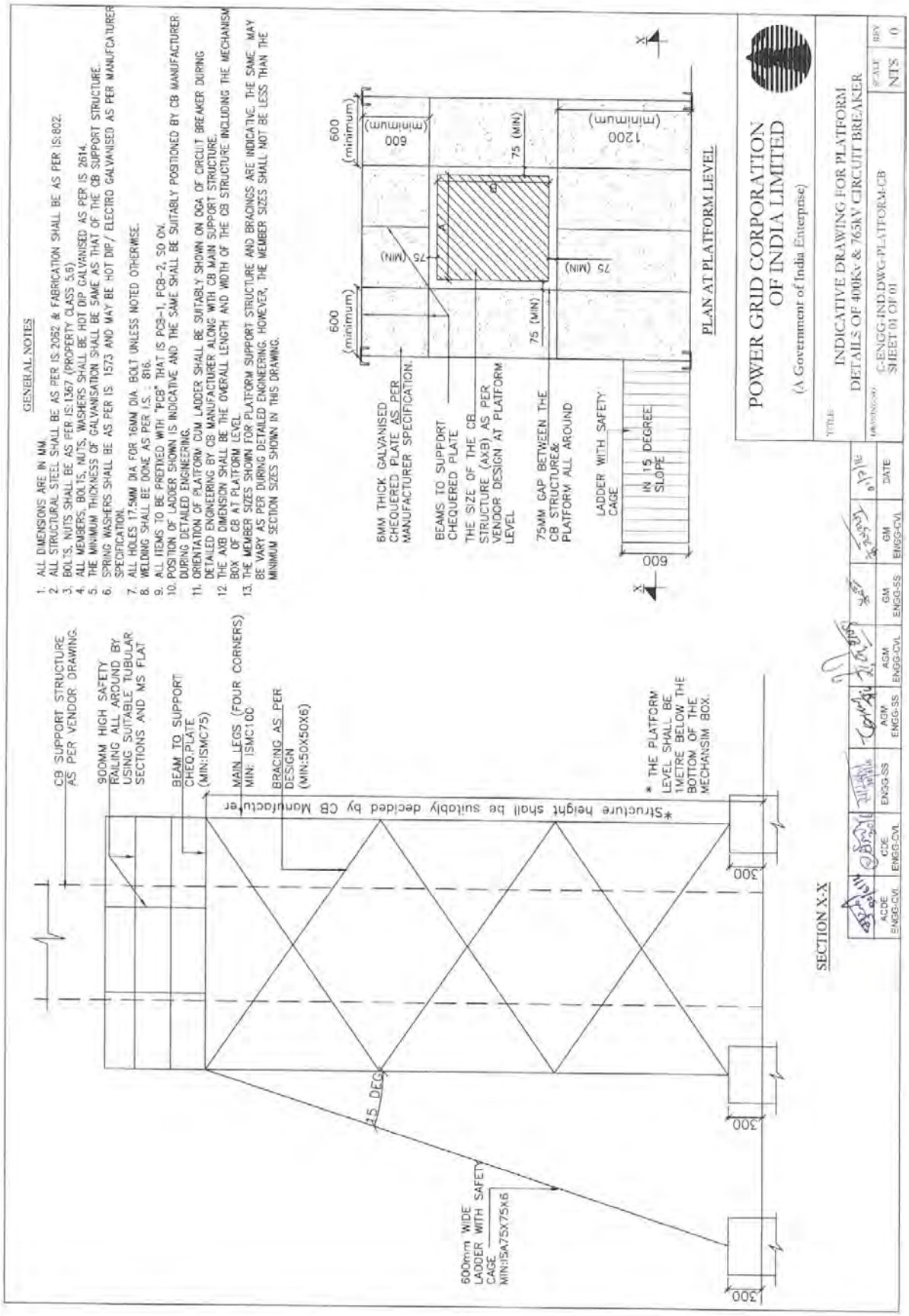
The actions required to be taken by contractor in case of defects observed in AIS type Circuit Breakers of ratings 132kV & above during the warranty period (defect liability period) shall be as per following. Further, the replaced/repaired/ refurbished equipment (or part of equipment) shall have warranty in line with the GCC clause 22 in SCC.

Sl.no.	Nature of problem	Corrective measures to be taken by contractor
1.	Blasting of interrupter, PIR, pole column,	Replacement of compete CB pole Including SF6 gas
	a. Abnormal DCRM and Travel Measurement b. Contact assembly and internal component damage, misalignment not leading to complete failure of interrupter/ PIR	Repair/replacement of affected assembly/ component based on repair procedure approved by QA
2.	Crack in insulator, cementing joint of interrupter , PIR , pole column	Replacement of affected part
3.	SF6 gas leakage from sealing and bolted joints. SF6 gas leakage detectable by any Leakage Detection Method	Rectification by replacement of gasket, O-ring, sealing, Interrupter or affected part to be replaced etc If unable to arrest the leakage in 02 attempts, replacement of interrupter/ column
4.	SF6 gas low dew point: > (-)35 deg C at atmospheric pressure.	Re-conditioning of gas. If does not improve, complete evacuation of CB, replacement filter material and gas
5.	Oil leakage of grading capacitor Change in Capacitance value beyond +/- 5 % w.r.t. to value of Capacitance obtained at site during pre-commissioning test.	Replacement or Refurbishment of grading capacitor
6.	Pole/ break discrepancy (during O&M) Limits: Break to Break (Opening/Closing) : max. 2.5 ms Phase to Phase (Opening) : max. 3.33 ms Phase to Phase (Closing) : max 5 ms	Rectification/replacement of affected parts
7.	Static Contact Resistance: increase >50% from factory/ pre-commissioning value or >75 micro-ohm/ break whichever is lower	Rectification/Replacement of pole
8.	Drive mechanism assembly failure	Rectification/ Replacement of affected part
9.	Trip/ close coil, density monitor, relays and contactors and components of common MB	Replacement of affected part

Note: 1) Replaced/Repaired/Refurbished Equipment (or part of equipment) shall have 2 years warranty without prejudice to contractual warranty period.

2) The measurement at site shall be carried out as per POWERGRID standard Pre-commissioning procedures as indicated in Technical Specification.

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SECTION-3

Refer document

General Technical Requirements: TB-431-316-000 Rev 00.

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BHARAT HEAVY ELECTRICALS LIMITED

TRANSMISSION BUSINESS ENGINEERING MANAGEMENT

DOCUMENT No.	**TB-431-316-000**	Rev. No.	**00**		Prepared	Checked	Approved
TYPE OF DOC.	**TECHNICAL SPECIFICATION**			SIGN			
TITLE	**GENERAL TECHNICAL REQUIREMENTS-SECTION 3**			NAME	PC	JK	VK
				DATE			
				GROUP	TBEM	W.O.	**431**

CUSTOMER	**Power Grid Corporation of India Limited** (POWERGRID)
Station	Powergrid Sub-Stations
Project	1. 765/400/220kV Barmer-I (New), 765kV Sirohi(Extn.) and 400kV Fatehgarh-III (Extn.) 2. 765/400/220/132kV Kurawar (New), 400kV Shujalpur(Extn.), 400kV Ashtha (Extn.) 765kV Mandsaur (Extn.) 3. 765/400/220kV Mandsaur (New), 765kV Indore (Extn.)

S.No.	Description	Sheet
1	Site Information	1
2	General Technical Requirements	30
3	Annexure -A	2
4	Annexure -B	1
5	Annexure -C	23
6	Annexure -G	6
7	Annexure -J	4
8	Annexure -K (Rev. 01)	2
9	Annexure- S1 (Size of control and Power cables)	4

RevNo.	Date	Altered	Checked	Approved	REVISION DETAILS

Distribution	To	TBEM	TBMM	TBQM	Supplier
	Copies	1	1	1	4

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Site Information -1

S.No.	Particular	Details
a)	Owner	Power Grid Corporation of India Limited (POWERGRID)
b)	Customer	Power Grid Corporation of India Limited (POWERGRID)
c)	Project Title	**765kV AIS Pkg SS-46T** for (a) Establishment of 765/400/220kV Barmer-I including 400kV, 2x125 MVAr Reactor; (b) Extn at 765kV Sirohi for termination of Barmer-I PS– Sirohi PS 765 kV D/c line; (c) Extn of 400kV Fatehgarh-III for termination of Fatehgarh-III (Section-2) PS – Barmer-I PS 400 kV D/c line
d)	Location	Barmer-I /Sirohi / Fatehgarh-III (Rajasthan)
e)	Transport Facilities	Nearest Rail Head for : **765/400/220kV Barmer –** Barmer Railway Station **765/400/220kV Sirohi –** Sirohi Railway Station **765/400/220kV Fatehgarh –** Fatehgarh Railway Station
SITE CONDITIONS		
f)	Max. ambient air temp.	50°C
g)	Min. ambient air temp.	0°C
h)	Max. design ambient temp.	50°C
i)	Costal area consideration	No
j)	Altitude above sea level	Less than 1000 meter above mean sea level (MSL)
k)	Seismic Zone	NBC2016
l)	Wind Zone	NBC2016
m)	Snow fall	NIL
	Main Electrical Parameters:	
n)	Fault Levels:	765kV: 50kA for 1 Sec 400kV: 63kA for 1 Sec 220kV: 50kA for 1 sec
o)	Creepage Distance	25mm/kV for All Equipment i.e. BPI/Bushings, CB, Isolator, CT, CVT, LA, WT, NCT etc. and for insulator string/ long rod insulators/ outdoor bushings - 31 mm/kV

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Site Information - 2

S.No.	Particular	Details
a)	Owner	Power Grid Corporation of India Limited (POWERGRID)
b)	Customer	Power Grid Corporation of India Limited (POWERGRID)
c)	Project Title	**765kV AIS Pkg SS-47T** for (a) Establishment of 765/400/220/132kV Kurawar Substation (New) including 1x125MVAr 420kV (3-Ph)Bus Reactor, (b) Extn of 400kV Shujalpur for termination of 400kVD/C Shujalpur – Kurawar TL, (c) Extn of 400kV Ashtha S/s for LILO of one circuit of Indore-Itarsi 400 kV D/c line at Ashtha & for termination of Kurawar-Ashtha 400 kV D/c line and (d) Extn of 765kV Mandsaur for termination of Mandsaur – Kurawar 765 kV D/c line.
d)	Location	Kurawar / Shujalpur / Ashtha / Mandsaur **(Madhya Pradesh)**
e)	Transport Facilities	Nearest Rail Head for : **765/400/220/132kV Kurawar –** Sehore Railway Station **400kV Shujalpur –** Shujalpur Railway Station **400kV Ashtha –** Sehore Railway Station **765kV Mandsaur –** Mandsaur Railway Station
SITE CONDITIONS		
f)	Max. ambient air temp.	50°C
g)	Min. ambient air temp.	0°C
h)	Max. design ambient temp.	50°C
i)	Costal area consideration	No
j)	Altitude above sea level	Less than 1000 meter above mean sea level (MSL)
k)	Seismic Zone	NBC2016
l)	Wind Zone	NBC2016
m)	Snow fall	NIL
	Main Electrical Parameters:	
n)	Fault Levels:	765kV: 50kA for 1 Sec 400kV: 63kA for 1 Sec 220kV: 50kA for 1 sec 132kV: 40kA for 1 sec
o)	Creepage Distance	25mm/kV for All Equipment i.e. BPI/Bushings, CB, Isolator, CT, CVT, LA, WT, NCT etc. and for insulator string/ long rod insulators/ outdoor bushings - 31 mm/kV

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Site Information - 3

S.No.	Particular	Details
a)	Owner	Power Grid Corporation of India Limited (POWERGRID)
b)	Customer	Power Grid Corporation of India Limited (POWERGRID)
c)	Project Title	**Substation Package -SS-43T for (a) Establishment of 765/400/ 220kV Mandsaur S/s including 400kV, 2x125MVAr (3-Ph) Reactor and (b) Extn. of 765kV Indore (PG) for termination of Mandsaur PS – Indore (PG) 765 kV D/c Line associated with "Transmission system for evacuation of power from Rajasthan REZ Ph-IV (Part-2 : 5.5GW) Jaisalmer/Barmer Complex)Part-C"**
d)	Location	**Mandsaur & Indore, Madhya Pradesh**
e)	Transport Facilities	Road/Train Nearest Rail Head For **765/400/220kV Mandsaur (New) PS -** Mandsaur Nearest Rail Head For **765/400kV Indore (PG) S/S -** Indore
	SITE CONDITIONS	
f)	Max. ambient air temp.	50°C
g)	Min. ambient air temp.	0°C
h)	Max. design ambient temp.	50°C
i)	Costal area consideration	No
j)	Altitude above sea level	Less than 1000 meter above mean sea level (MSL)
k)	Seismic Zone	NBC2016
l)	Wind Zone	NBC2016
m)	Snow fall	NIL
	Main Electrical Parameters:	
n)	Fault Levels:	765kV: 50kA for 1 Sec 400kV: 63kA for 1 Sec 220kV: 50kA for 1 sec
o)	Creepage Distance	25mm/kV for All Equipment i.e BPI/Bushings, CB, Isolator, CT, CVT, LA, WT, NCT etc. and for insulator string/ long rod insulators/ outdoor bushings - 31 mm/kV

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GENERAL TECHNICAL REQUIREMENTS - SECTION 3

1.0 FOREWORD

The provisions under this section are intended to supplement requirements for the materials, equipment's and services covered under other sections of tender documents and are not exclusive.

The Supplier shall note that the standards mentioned herein are not mutually exclusive or complete in themselves, but are intended to complement each other, with minimum repetition, to define the requirements of the Specification. In the event of a conflict between requirements of any two clauses of the Specification/ documents or requirements of different codes/ standards specified, the more stringent requirement as per the interpretation of the owner shall apply, unless confirmed otherwise by the owner in writing based on a written request from the Supplier.

In case of conflicting requirements between this document (General Technical Requirement Section 3) and equipment specification (Section 1 & Section 2), equipment specification shall prevail.

When specific requirements stipulated in the Specification exceed or change those required by the applicable standards, the stipulations of the Specification shall take precedence.

Unless specifically agreed to by the Purchaser prior to Award of Contract, the Work shall be in accordance with the standards indicated and the requirements of the Specification. The Supplier shall be held responsible for any deviation.

In case of conflict between the various standards, the decision of owner shall be binding & final.

The following words and expressions shall have the meanings hereby assigned to them throughout this document

"Employer/Owner" means Power Grid Corporation of India Ltd.

"Purchaser" means Bharat Heavy Electricals Limited.

"Supplier/Manufacturer/Bidder" means the person or persons, firm or company assigned to execute the works as defined by the scope of supply, described here.

"Specification" refers to this document.

The supplier should be approved by Power Grid. If not, it is the responsibility of the vendor to be assessed and approved by Power Grid, before placement of order by BHEL. Any cost involved in vendor

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assessment/approval must be borne by the vendor himself.

2.0 GENERAL REQUIREMENT

2.1 a) All equipment/materials/items, as applicable under present scope of works, shall be supplied by domestic manufacturers only with **minimum Local Content for individual items as listed annexure-K (rev.01)**

Any imported equipment/material/item/parts/component (comprising of embedded systems) to be supplied under the contract shall be tested in the certified laboratories to check for any kind of embedded malware/trojans/cyber threats and for adherence to Indian Standards as per the directions issued by Ministry of Power/Govt. of India from time to time. In case of such import from specified "prior reference" countries, the requirement of prior permission from the Govt. of India including protocol for testing in certified and designated laboratories by Ministry of Power/Govt. of India shall also be complied with by the Bidder.

The bidder/contractor shall list out the products and components producing Toxic e-waste under the contract and shall furnish to the Employer the procedure of safe disposal at the time of closing of the contract.

2.1 b) The Supplier/Manufacturer shall furnish catalogues, engineering data, technical information, design documents, drawings etc., fully in conformity with the technical specification during detailed engineering.

2.2 It is recognised that the Bidder may have standardised on the use of certain components, materials, processes or procedures different from those specified herein. Alternate proposals offering similar equipment based on the manufacturer's standard practice will also be considered provided such proposals meet the specified designs, standard and performance requirements and are acceptable to Employer.

2.3 Wherever a material or article is specified or defined by the name of a particular brand, Manufacturer or Vendor, the specific name mentioned shall be understood as establishing type, function and quality and not as limiting competition.

2.4 Equipment furnished shall be complete in every respect with all mountings, fittings, fixtures and standard accessories 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 unless included in the list of exclusions. Materials and components which are minor in nature and incidental to the requirement but not specifically stated in the specification, which are necessary for commissioning and satisfactory operation of the switchyard/ 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.

2.5 Deleted.

2.6 Deleted.

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3.0 STANDARDS

3.1 The works covered by the specification shall be designed, engineered, manufactured, built, tested and commissioned in accordance with the Acts, Rules, Laws and Regulations of India.

3.2 The equipment offered by the Bidder shall at least conform to the requirements specified under relevant IS standard. In case of discrepancy between IS and other international standard, provisions of IS shall prevail. The Bidder shall also note that the list of standards presented in Annexure-C is not complete. Whenever necessary, the list of standards shall be considered in conjunction with specific IS. If the IS standard is not available for an equipment/material, then other applicable International standard (IEC/Equivalent), as per the specification, shall be accepted.

3.3 The Bidder shall note that standards mentioned in the specification are not mutually exclusive or complete in themselves, but intended to complement each other.

3.4 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.

3.5 Other internationally accepted standards which ensure equivalent or better performance than that specified in the standards specified under Annexure-C / individual sections for various equipments shall also, be accepted, however the salient points of difference shall be clearly brought out during detailed engineering along with English language version of such standard. The equipment conforming to standards other than specified under Annexure-C /individual sections for various equipments shall be subject to Employer's approval.

4.0 SERVICES TO BE PERFORMED BY THE EQUIPMENT BEING FURNISHED

4.1 Switching surge over voltage and power frequency over voltage is specified in the system parameters below. In case of the 400kV system, the initial value of the temporary overvoltages could be 2.0 p.u. for 1-2 cycles. The equipment furnished under this specification shall perform all its functions and operate satisfactorily without showing undue strain, restrike etc under such over voltage conditions.

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

4.3 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.

4.4 The Bidder shall design terminal connectors of the equipment taking into account various forces as above at Sl.No.4.3 that are required to withstand.

4.5 The equipment shall also comply to the following:

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

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b) All piping, if any between equipment control cabinet/operating mechanism to marshalling box of the equipment, shall bear proper identification to facilitate the connection at site.

4.6 **System Parameter**

765kV, 400kV & 220kV System

SL No	Description of parameters	765kV System	400kV System	220kV System
1.	System operating voltage	765kV	400kV	220kV
2.	Maximum operating voltage of the system (rms)	800kV	420kV	245kV
3.	Rated frequency	50Hz	50Hz	50Hz
4.	No. of phase	3	3	3
5.	Rated Insulation levels			
i)	Full wave impulse withstand voltage (1.2/50 microsec.)	2100kVp	1550kVp	1050 kVp
ii)	Switching impulse withstand voltage (250/2500 micro sec.) dry and wet	1550kVp	1050kVp	-
iii)	One minute power frequency dry withstand voltage (rms)	830kV	630kV	-
iv)	One minute power frequency dry and wet withstand voltage (rms)	-	-	460kV
6.	Corona extinction voltage	508kV	320kV	-
7.	Max. radio interference voltage for frequency between 0.5 MHz and 2 MHz	2500 µV at 508kV rms	1000 µV at 266kV rms	1000 µV at 156kV rms
8.	Minimum creepage distance - for Equipment other than Insulator string	20000 mm	10500 mm	6125 mm
	Minimum creepage distance - for Insulator String	24800 mm	13020 mm	7595 mm
9.	Min. clearances			
i.	Phase to phase	7600mm (for conductor conductor configuration) 9400mm (for rod -conductor configuration)	4000mm (for conductor conductor configuration) 4200mm (for rod - conductor configuration)	2100 mm
ii.	Phase to earth	4900mm (for conductor-structure)	3500 mm	2100 mm

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		6400mm (for rod- structure)		
iii)	Sectional clearances	10300 mm	6500 mm	5000 mm
10.	Rated short circuit current for 1 sec. duration	50kA	63 kA	50kA
11.	System neutral earthing	Effectively earthed	Effectively earthed	Effectively earthed

66kV, 52kV and 33kV System

SL No	Description of parameters	66kV System	52 kV System	33 kV System
1.	System operating voltage	66kV	52kV	33kV
2.	Maximum operating voltage of the system(rms)	72.5kV	52kV	36kV
3.	Rated frequency	50Hz	50Hz	50Hz
4.	No. of phase	3	3	3
5.	Rated Insulation levels			
i)	Full wave impulse withstand voltage (1.2/50 microsec.)	325 kVp	250 kVp	170 kVp
ii)	One-minute power frequency dry and wet withstand voltage (rms)	140kV	95kV	70kV
6.	Max. radio interference voltage for frequency between 0.5 MHz and 2 MHz	-	-	-
7.	Minimum creepage distance	1813 mm (2248mm for coastal area)	1300mm (1612 mm for coastal area)	900 mm (1116m m for coastal area)
8.	Min. Clearance			
i.	Phase to phase	750 mm	530mm	320 mm
ii.	Phase to earth	630 mm	480mm	320 mm
iii.	Sectional clearances	3100 mm	3100mm	2800 mm
9.	Rated short circuit current	25kA for 3 Sec*	25kA for 1 Sec	25 kA for 3 sec
10.	System neutral earthing	Effectively earthed	Effectively earthed	Effectively earthed

Notes:

1. The above parameters are applicable for installations up to an altitude of 1000m above mean sea level. For altitude exceeding 1000m, necessary altitude correction factor shall be applicable as per relevant IEC/IS.
2. The insulation and RIV levels of the equipments shall be as per values given in the Technical Specification of respective equipment.

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3. Corona and radio interference voltage test and seismic withstand test procedures for equipments shall be in line with the procedure given at **Annexure-A** and **Annexure-B** respectively.

4. "*" For tertiary loading Equipment's fault level shall be 25kA for 3 Sec.

5.0 ENGINEERING DATA AND DRAWINGS

5.1 Deleted.

5.2 Deleted.

5.3 Drawings

5.3.1 All drawings submitted by the Bidder shall be in sufficient detail to indicate the type, size, arrangement, material description, Bill of Materials, weight of each component, break-up for packing and shipment, dimensions, internal & the external connections, fixing arrangement required and any other information specifically requested in the specifications.

5.3.2 Drawings submitted by the Bidder shall be clearly marked with the name of the Employer, the unit designation, the specifications title, the specification number and the name of the Project. POWERGRID has standardized a large number of drawings/documents of various make including type test reports which can be used for all projects having similar requirements and in such cases no project specific approval (except for list of applicable drawings alongwith type test reports) is required. However, distribution copies of standard drawings/documents shall be submitted as per provision of the contract. All titles, noting, markings and writings on the drawing shall be in English. All the dimensions should be in SI units.

5.3.3 The review of these data by the Employer will cover only general conformance of the data to the specifications and documents, interfaces with the equipment provided under the specifications, external connections and of the dimensions which might affect substation layout. This review by the Employer may not indicate a thorough review of all dimensions, quantities and details of the equipment, materials, any devices or items indicated or the accuracy of the information submitted. This review and/or approval by the Employer shall not be considered by the Contractor, as limiting any of his responsibilities and liabilities for mistakes and deviations from the requirements, specified under these specifications and documents.

5.5 All manufacturing and fabrication work in connection with the equipment prior to the approval of the drawings shall be at the Bidder's risk. The Bidder may make any changes in the design which are necessary to make the equipment conform to the provisions and intent of the Contract and such changes will again be subject to approval by the Employer. Approval of Bidder's drawing or work by the Employer shall not relieve the bidder of any of his responsibilities and liabilities under the Contract.

5.6 All engineering data submitted by the Bidder after final process including review and approval by the Employer shall form part of the Contract Document and the entire works performed under these specifications shall be performed in strict conformity, unless otherwise expressly requested by the Employer in Writing.

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5.7 Approval Procedure

The following schedule shall be followed generally for approval and for providing final documentation.

i)	Approval/comments/ by Employer on initial submission	15 days
ii)	Resubmission (whenever required)	Within 3 (three) weeks from date of comments
iii)	Approval or comments	Within 3 (three) weeks of receipt of resubmission
iv)	Furnishing of distribution copies (2 hard copies to each substation and one scanned copy (pdf format)	Within 3 (three) weeks of receipt of resubmission
v)	Furnishing of distribution copies of test reports	
	a) Type test reports (one scanned softcopy in pdf format to each substation plus one for corporate centre & one hardcopy per substation)	2 weeks from the date of final approval
	b) Routine Test Reports (one copy for each substation)	-do-
vi)	Furnishing of instruction/ operation manuals (2 copies per substation and one softcopy (pdf format) for corporate centre & per substation)	On completion of Engineering
vii)	As built drawings (two sets of hardcopy per substation & one softcopy (pdf format) for corporate centre & per substation)	On completion of entire works

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NOTE :

(1) The bidder may please note that all resubmissions must incorporate all comments given in the earlier submission by the Employer or adequate justification for not incorporating the same must be submitted failing which the submission of documents is likely to be returned.

(2) Deleted.

(3) The instruction Manuals shall contain full details of drawings of all equipment being supplied under this contract, their exploded diagrams with complete instructions for storage, handling, erection, commissioning, testing, operation, trouble shooting, servicing and overhauling procedures.

(4) If after the commissioning and initial operation of the substation, the instruction manuals require any modifications/additions/changes, the same shall be incorporated and the updated final instruction manuals shall be submitted by the Contractor to the Employer.

(5) The Bidder shall furnish to the Employer catalogues of spare parts.

(6) All As-built drawings/documents shall be submitted after incorporating the changes before final submission.

5.8 Deleted.

6.0 MATERIAL/ WORKMANSHIP

6.1 General Requirement

6.1.1 Where the specification does not contain references to workmanship, equipment, materials and components of the covered equipment, it is essential 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.

6.1.2 In case where the equipment, materials or components are indicated in the specification as “similar” to any special standard, the Employer shall decide upon the question of similarity. When required by the specification or when required by the Employer the Contractor shall submit, for approval, all the information concerning the materials or components to be used in manufacture. Machinery, equipment, materials and components supplied, installed or used without such approval shall run the risk of subsequent rejection, it is to be understood that the cost as well as the time delay associated with the rejection shall be borne by the Bidder.

6.1.3 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 fulfil 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 Employer.

6.1.4 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

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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.

6.1.5 Deleted.

6.1.6 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.

6.1.7 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. If such is the case, he shall declare source of oil/grease /other consumables in the GTP/Drawings, where such oil or grease is available. He shall help Employer in establishing equivalent Indian make and Indian Contractor. The same shall be applicable to other consumables too.

6.2 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.

6.2.1 Space Heaters

6.2.1.1 The heaters shall be suitable for continuous operation at 240V as supply voltage. On off switch and fuse shall be provided.

6.2.1.2 One or more adequately rated thermostatically connected heaters shall be supplied to prevent condensation in any compartment. The heaters shall be installed in 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.

6.2.2 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 interfere with the operation or performance of the equipment. Such surfaces or parts shall be protected against the application of the varnish.

6.2.3 Ventilation opening

Wherever ventilation is provided, the compartments shall have ventilation openings with fine wire mesh of brass to prevent the entry of insects and to reduce to a minimum the entry of dirt and dust.

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6.2.4 Degree of Protection

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

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

The degree of protection shall be in accordance with IS/IEC60947; IS/IEC/60529. Type test report for of relevant Degree of Protection test, shall be submitted for approval.

6.3 RATING PLATES, NAME PLATES AND LABELS

6.3.1 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, Customer 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 Employer. The rating plate of each equipment shall be according to IS/ IEC requirement.

6.3.2 All such nameplates, instruction plates, rating plates of transformers, reactors, CB, CT, CVT, SA, Isolators, C & R panels and PLCC 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.

6.4 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 operation, shall be furnished by the Bidder unless specifically excluded under the exclusions in these specifications and documents.

7.0 DESIGN IMPROVEMENTS / COORDINATION

7.1 Deleted.

7.2 Deleted.

7.3 The Bidder shall be responsible for the selection and design of appropriate equipments to provide the best co-ordinated performance of the entire system. The basic design requirements are detailed out in this Specification. The design of various components, sub-assemblies and

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assemblies shall be so done that it facilitates easy field assembly and maintenance.

7.4 The Bidder has to coordinate designs and terminations with the agencies (if any) who are Consultants/Bidder for the Employer. The names of agencies shall be intimated to the successful bidders.

7.5 The Bidder will be called upon to attend design co-ordination meetings with the Engineer, other Contractor's and the Consultants of the Employer (if any) during the period of Contract. The Bidder shall attend such meetings at his own cost at POWERGRID Corporate Centre, Gurgaon (Haryana) or at mutually agreed venue as and when required and fully cooperate with such persons and agencies involved during those discussions.

8.0 QUALITY ASSURANCE PROGRAMME

8.1 To ensure that the equipment and services under the scope of this Contract, whether manufactured or performed within the Bidder's Works or at his Sub-Bidder's premises or at the Employer's site or at any other place of Work as applicable, are in accordance with the specifications, the Contractor shall ensure suitable quality assurance programme to control such activities at all points necessary. A quality assurance programme of the Contractor shall be in line with ISO requirements & shall generally cover the following:

a) The organisation structure for the management and implementation of the proposed quality assurance programme.

b) System for Document and Data Control.

c) Qualification and Experience data of Bidder's key personnel.

d) The procedure for purchases of materials, parts, components and selection of sub-Bidder's services including vendor analysis, source inspection, incoming raw material inspection, verification of material purchases etc.

e) System for shop manufacturing and site erection controls including process controls, fabrication and assembly control.

f) System for Control of non-conforming products including deviation dispositioning, if any and system for corrective and preventive actions based on the feedback received from the Customers and also internally documented system for Customer complaints.

g) Inspection and test procedure both for manufacture and field activities.

h) System for Control of calibration of testing and measuring equipment and the indication of calibration status on the instruments.

i) System for indication and appraisal of inspection status.

j) System of Internal Quality Audits, Management review and initiation of corrective and Preventive actions based on the above.

k) System for authorising release of manufactured product to the Employer.

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l) System for maintenance of records.

m) System for handling, storage and delivery.

n) A quality plan detailing out the specific quality control measures and procedure adopted for controlling the quality characteristics relevant to each item of equipment furnished and /or service rendered.

o) System for various field activities i.e. unloading, receipt at site, proper storage, erection, testing and commissioning of various equipment and maintenance of records. In this regard, the Employer has already prepared Standard Field Quality Plan for transmission line/substation equipments as applicable, Civil/erection Works which is required to be followed for associated works.

The Employer or his duly authorised representative reserves the right to carry out quality audit and quality surveillance of the system and procedure of the Bidder/his vendor's quality management and control activities.

8.2 **Quality Assurance Documents**

The Bidder shall ensure availability of the following Quality Assurance Documents:

i) All Non-Destructive Examination procedures, stress relief and weld repair procedure actually used during fabrication, and reports including radiography interpretation reports.

ii) Welder and welding operator qualification certificates.

iii) Welder's identification list, welding operator's qualification procedure and welding identification symbols.

iv) Raw Material test reports on components as specified by the specification and in the quality plan.

v) The Manufacturing Quality Plan(MQP) indicating Customer Inspection Points (CIPs) at various stages of manufacturing and methods used to verify that the inspection and testing points in the quality plan were performed satisfactorily.

vi) Factory test results for testing required as per applicable quality plan/technical specifications/GTP/Drawings etc.

vii) Stress relief time temperature charts/oil impregnation time temperature charts, wherever applicable.

8.3 INSPECTION, TESTING & INSPECTION CERTIFICATE

8.3.1 The responsibility and the basis of inspection for various items & equipment is placed at **Annexure-G** along with the requirement of MQP (Manufacturing Quality Plan), ITP(Inspection & Test Plan), FAT(Factory Acceptance Test) which should be valid & POWERGRID approved and Level of inspection envisaged against each item.

Bidder shall ensure that order for items where MQP/ITP/FAT is required will be placed only on vendors having valid MQP/ITP/FAT and where the

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supplier's MQP/ITP/FAT is either not valid or has not been approved by POWERGRID, MQP shall be generally submitted as per POWERGRID format before placing order.

Items not covered under MQP/ITP/FAT shall be offered for inspection as per POWERGRID LOA/technical Specifications/POWERGRID approved data sheets/ POWERGRID approved drawings and relevant Indian/International standards.

Inspection **Levels**: For implementation of projects in a time bound manner and to avoid any delay in deputation of POWERGRID or its authorized representative, involvement of POWERGRID for inspection of various items / equipment will be based on the level below:

Level –I: Bidder to raise all inspection calls and review the report of tests carried out by the manufacturer, on his own, as per applicable standards/ POWERGRID specification, and submit to concerned POWERGRID inspection office/Inspection Engineer. CIP/MICC will be issued by POWERGRID based on review of test reports/certificates of manufacturers.

Level – II: Bidder to raise all inspection calls and carry out the inspection on behalf of POWERGRID on the proposed date of inspection as per applicable standards/specification. However, in case POWERGRID wishes to associate itself during inspection, the same would be intimated to Bidder and CIP/MICC will be issued by POWERGRID. Else, Bidder would submit their test reports/certificates to POWERGRID. CIP/MICC will be issued by POWERGRID based on review of test reports/ certificates.

Level - III: Bidder to raise inspection calls for both, stage (as applicable) & final inspection and carry out the stage inspections (if applicable) on behalf of POWERGRID on the proposed date of inspection as per applicable standards/specification. However, in case POWERGRID wishes to associate itself during stage inspection, the same would be intimated to Bidder and CIP will be issued by POWERGRID. Else, Bidder would submit the test reports / certificates of stage inspection after their own review and CIP will be issued by POWERGRID based on review of test reports / certificates. Final inspection will be carried out by POWERGRID and CIP/MICC will be issued by POWERGRID.

Level – IV: Bidder to raise inspection calls for both, stage (as applicable) & final inspections. POWERGRID will carry out the inspection for both stage & final inspection as per applicable standards/specification and CIP/MICC will be issued by POWERGRID.

8.3.2 Bidder shall ensure that to implement the above inspection levels, particularly for the quality control and inspection at sub-vendor's works, they would depute sufficient qualified & experienced manpower in their Quality Control and Inspection department. Further, to assure quality of construction, Bidder shall have a separate workforce having appropriate qualification & experience and deploy suitable tools and plant for maintaining quality requirement during construction in line with applicable Field Quality Plan (FQP).

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8.3.3 The Employer, his duly authorised representative and/or outside inspection agency acting on behalf of the Employer shall have at all reasonable times access to the Bidder's premises or Works and shall have the power at all reasonable times to ensure that proper Quality Management practices / norms are adhered to, inspect and examine the materials & workmanship of the Works, to carry out Quality/Surveillance Audit during manufacture or erection and if part of the Works is being manufactured or assembled at other premises or works. The Bidder shall obtain for the Employer and for his duly authorised representative permission to inspect as if the works were manufactured or assembled on the Bidder's own premises or works. The item/equipment, if found unsatisfactory with respect to workmanship or material is liable to be rejected. The observations for improvements during product/ process inspection by POWERGRID shall be recorded in Quality Improvement Register (available & maintained at works) for review & timely compliance of observations.

8.3.4 Bidder shall submit inspection calls over internet through POWERGRID website. The required vendor code and password to enable raising inspection call will be furnished to the main Contractor within 30 days of award of contract on submission of documents by Contractor. After raising the inspection calls, Contractor shall then proceed as per the message of that particular call which is available on the message board.

8.3.5 The Employer reserves the right to witness any or all type, acceptance and routine tests specified for which the Bidder shall give the Employer/Inspector Twenty one (21) days written notice of any material being ready for testing for each stage of testing as identified in the approved quality plan as customer inspection point (CIP) for indigenous inspections. All inspection calls for overseas material shall be given at least forty five (45) days in advance. Such tests shall be to the Bidder's account except for the expenses of the Inspection Engineer. The Employer/inspector, unless witnessing of the tests is waived by Employer, will attend such tests within Twenty one (21) days of the date of which the equipment is notified as being ready for test/inspection, failing which the Bidder may proceed with the test which shall be deemed to have been made in the Inspector's presence and he shall forthwith forward to the Inspector three copies of tests, duly certified. Bidder shall ensure, before giving notice for type test, that all drawings and quality plans have been got approved. The equipment shall be dispatched to site only after approval of Routine and Acceptance test results and Issuance of Dispatch Clearance in writing by the Employer. CIP/Material Inspection clearance certificate (MICC) shall be issued by the Employer after inspection of the equipment or review of test reports as applicable. Employer may waive off the presence of Employer's inspecting engineer. In that case test will be carried out as per approved QP and test certificate will be furnished by the supplier for approval. CIP/MICC will be issued only after review and approval of the test reports.

8.3.6 Bidder shall generally offer material for inspection as per supply bar chart approved by POWERGRID and not before 30 days from schedule indicated in the bar chart. In case Bidder offers material(s) for inspection prior to 30 days from the scheduled date with necessary approval of POWERGRID, POWERGRID shall inspect the material and issue CIP only. However, in

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such an exceptional case, MICC shall be issued only as per provision of original / revised approved supply schedule.

8.3.7 Bidder shall minimize the number of inspection calls by offering optimum quantities in each inspection call at the respective manufacturer's works.

8.3.8 Bidder shall inspect the material themselves and only after they are fully convinced about the Quality, they shall offer the material for POWERGRID inspection and shall also ensure that relevant portion of LOA/NOA, approved drawing and data sheets along with applicable Quality Plans are available at the works of Contractor or their Sub-vendor before the material is offered for inspection.

8.3.9 Bidder shall ensure that material which has been cleared for dispatch after inspection will be dispatched within 30 days in case of domestic supplies and within 60 days in case of Off-shore supplies from the date of issuance of CIP. Material which is not dispatched within stipulated time as above will be reoffered for POWERGRID inspection or specific approval of POWERGRID QA&I shall be obtained for delayed dispatch.

8.3.10 The Employer or IE shall give notice in writing to the Bidder, of any objection either to conformance to any drawings or to any equipment and workmanship which in his opinion is not in accordance with the Contract. The Bidder shall give due consideration to such objections and shall either make the modifications that may be necessary to meet the said objections or shall confirm in writing to the Employer/Inspection Engineer giving reasons therein, that no modifications are necessary to comply with the Contract.

8.3.11 All Test Reports and documents to be submitted in English during final inspection of equipment by POWERGRID or as and when required for submission.

8.3.12 When the factory tests have been completed at the Bidder's or Sub-Bidder's works, the Employer/Inspection Engineer(IE) shall issue a certificate to this effect within fifteen (15) days after completion of tests & submission of documents by Bidder/manufacturer but if the tests are not witnessed by the Employer/IE, the certificate shall be issued within fifteen (15) days of receipt of the Bidder's Test certificate by the Employer/IE. Bidder shall, on completion of all tests, submit test reports within Ten (10) days to POWERGRID IE. Failure of the Employer/IE to issue such a certificate shall not prevent the Contractor from proceeding with the Works. The completion of these tests or the issue of the certificate shall not bind the Employer to accept the equipment should, it, on further tests after erection, be found not to comply with the Contract.

8.3.13 In all cases, where the Contract provides for tests whether at the premises or works of the Bidder or of any Sub-Bidder, the Bidder, except where otherwise specified, shall provide free of charge such items as labour, materials, electricity, fuel, water, stores, apparatus and instruments as may be reasonably demanded by the Employer/Inspector or his authorised representative to carry out effectively such tests of the equipment in accordance with the Contract and shall give facilities to the Employer/Inspection Engineer or to his authorised representative to accomplish testing.

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8.3.14 The inspection and acceptance by Employer and issue of Inspection Certificate thereon shall in no way limit the liabilities and responsibilities of the Contractor in respect of the agreed quality assurance programme forming a part of the Contract, or if such equipment is found to be defective at a later stage.

8.3.15 The Employer will have the right of having at his own expenses any other test(s) of reasonable nature carried out at Contractor's premises or at site or in any other place in addition of aforesaid type and routine tests, to satisfy that the material comply with the specification.

8.3.16 The Employer reserves the right for getting any additional field tests conducted on the completely assembled equipment at site to satisfy that material complies with specifications.

8.3.17 Rework/ Re-engineering, if any, on any item/equipment shall be carried out only after mutual discussions and in accordance with mutually agreed procedure. Bidder shall submit Joint Inspection Report of equipments under Re-Work/Re-Engineering alongwith procedure for the same to POWERGRID for approval, before taking up the Re-Work/Re-Engineering, failing which POWERGRID reserves the right to reject the equipment.

8.3.18 Bidder may establish a field test Laboratory to execute Civil Construction testing requirements at site with the condition that all testing equipment shall be calibrated from POWERGRID approved accredited Testing laboratories, with calibration certificates kept available at site and all testing personnel employed in the Field-Testing Laboratories to be qualified and experienced Engineers or testing to be carried out at POWERGRID approved Third Party Laboratories.

8.3.19 Bidder shall ensure that all possible steps are taken to avoid damages to the equipment during transport, storage and erection.

8.3.20 Deleted.

8.3.21 Bidder shall ensure commissioning of all CSDs along with Circuit Breakers wherever applicable.

8.3.22 **For EHV transformers/reactors**:

Insulation oil shall be as per POWERGRID Technical specifications and same grade shall be used for impregnation of the active part & testing at the works of Transformer/Reactor Manufacturer and as well as for filling the Transformer/Reactors at site. Contractor to ensure that windings for Transformer/Reactors are made in air-conditioned environment. Core-coil assembly shall be performed in positive pressurized dust-controlled environment. Dust measurements shall be monitored regularly at Transformer / Reactor Manufacturer works. Contractor shall ensure that respective civil foundations & Fire walls for Transformer/Reactors units to be commissioned, shall be made ready at concerned sites before receipt of Transformer/Reactors units. All the requisite material for Neutral & Delta Bus formation required for charging of complete bank of 765KV class 1-ph Transformer/Reactor units shall be made available at the concerned sites before receipt of the Transformer/Reactor units at site.

8.3.23 The Employer reserves the right to increase or decrease their involvement in inspections at Bidder's Works or at his Sub-Bidder's premises or at the

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Employer's site or at any other place of Work based on performance of Bidder/sub-bidder.

9.0 TYPE TESTING & CLEARANCE CERTIFICATE

9.1 All equipment being supplied shall conform to type tests as per technical specification and shall be subject to routine tests in accordance with requirements stipulated under respective sections.

9.2 The reports for all type tests as per technical specification shall be furnished by the Contractor along with equipment / material drawings. However, type test reports of similar equipments/ material already accepted in POWERGRID shall be applicable for all projects with similar requirement. The type tests conducted earlier 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 POWERGRID/representative authorized by POWERGRID/representative of Utility /representative of accredited test lab/ representative of The National Accreditation Board for Certification Bodies (NABCB) certified agency shall also be acceptable.
Unless otherwise specified elsewhere, the type test reports submitted shall be of the tests conducted within the years specified below from the date of NOA. In case the test reports are of the test conducted earlier than the years specified below from the date of NOA, the contractor shall repeat these test(s) at no extra cost to the Employer.

S.No	Name of Equipment	Validity of type test (in years)
1	Power Transformer	5
2	LT Transformer	5
3	Shunt Reactor	5
4	OLTC	10
5	Bushing of Power Transformers/Reactors	7
6	Fittings and accessories for Power transformers & Reactors	10
7	Circuit Breaker	10
8	Isolator	10
9	Lighting Arrester	10
10	Wave Trap	10
11	Instrument transformer	7
12	GIS & Hybrid GIS	10
13	LT Switchgear	10
14	Cable and associated accessories	10
15	Relays	7
16	Capacitors	10
17	Battery & Battery Charger	7
18	Conductor & Earth wire	10
19	Insulators (Porcelain/Glass)	10
20	Composite Insulators	5
21	PLCC	5

Note :
For all other equipment's validity of type test shall be 10 years from date of NOA.

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Further, 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 or any/all type tests not carried out, same shall be carried out without any additional cost implication to the Employer.

The Contractor shall intimate the Employer the detailed program about the type tests at least two (2) weeks in advance in case of domestic supplies & six (6) weeks in advance in case of foreign supplies.

9.3 The Employer intends to repeat those type tests which are indicated in the price schedule and the same shall be payable as per provision of contract. The price of conducting type tests shall be included in Bid price and break up of these shall be given in the relevant schedule of Bid Proposal Sheets. These Type test charges would be considered in bid evaluation. In case Bidder does not indicate charges for any of the type tests or does not mention the name of any test in the price schedules, it will be presumed that the particular test has been offered free of charge. Further, in case any Bidder indicates that he shall not carry out a particular test, his offer shall be considered incomplete and shall be liable to be rejected. The Employer reserves the right to waive the repeating of type tests partly or fully and in case of waival, test charges for the same shall not be payable.

9.4 The Employer reserves the right to witness any or all the type tests. The Employer shall bear all expenses for deputation of Employer's representative(s) for witnessing the type tests except in the case of re-deputation if any, necessitated due to no fault of the Employer.

9.5 The list of makes of various items, for which Type test reports are not required to be submitted are specified at Annexure-J.

10.0 Deleted.

11.0 PACKAGING & PROTECTION

11.1 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. On request of the Employer, the Bidder shall also submit packing details/associated drawing for any equipment/material under his scope of supply, to facilitate the Employer to repack any equipment/material at a later date, in case the need arises. While packing all the materials, the limitation from the point of view of availability of Railway wagon sizes in India should be taken into account. The 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 Contractor. Employer/BHEL takes no responsibility of the availability of the wagons.

11.2 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 protecting device. All ends of all valves and pipings and conduit equipment

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connections shall be properly sealed with suitable devices to protect them from damage.

12.0 FINISHING OF METAL SURFACES

12.1 All metal surfaces shall be subjected to treatment for anti-corrosion protection. All ferrous surfaces for external use unless otherwise stated elsewhere in the specification or specifically agreed, shall be hot-dip galvanized after fabrication. All steel conductors including those used for earthing/grounding (above ground level) shall also be galvanized according to IS: 2629.

12.2 HOT DIP GALVANISING

12.2.1 The minimum weight of the zinc coating shall be 610 gm/sq.m and minimum average thickness of coating shall be 86 microns for all items having thickness 6mm and above. For items lower than 6mm thickness requirement of coating thickness shall be as per relevant ASTM. For surface which shall be embedded in concrete, the zinc coating shall be 610 gm/sq.m minimum.

12.2.2 The galvanized surfaces shall consist of 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.

12.2.3 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 or alternate approved treatment shall be provided to avoid formation of white rust after hot dip galvanization.

12.2.4 The galvanized steel shall be subjected to four numbers of one minute dips in copper sulphate solution as per IS-2633.

12.2.5 Sharp edges with radii less than 2.5 mm shall be able to withstand four immersions of the Standard Preece test. All other coatings shall withstand six immersions. The following galvanizing tests should essentially be performed as per relevant Indian Standards.

- Coating thickness
- Uniformity of zinc
- Adhesion test
- Mass of zinc coating

12.2.6 Galvanised material must be transported properly to ensure that galvanised surfaces are not damaged during transit. Application of touch-up zinc rich paint at site shall be allowed with approval of Engineer Incharge.

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12.3 PAINTING

12.3.1 All sheet steel work shall be degreased, pickled, phosphated in accordance with the IS6005 "Code of practice for phosphating iron and sheet". All surfaces, which will not be easily accessible after shop assembly, shall beforehand be treated and protected for the life of the equipment. The surfaces, which are to be finished painted after installation or require corrosion protection until installation, shall be shop painted with at least two coats of primer. Oil, grease, dirt and swaf shall be thoroughly removed by emulsion cleaning. Rust and scale shall be removed by pickling with dilute acid followed by washing with running water, rinsing with slightly alkaline hot water and drying.

12.3.2 Hot Phosphating shall be done for phosphating process under pretreatment of sheets After phosphating, thorough rinsing shall be carried out with clean water followed by final rinsing with dilute dichromate solution and oven drying. The phosphate coating shall be sealed with application of two coats of ready mixed, stoving type zinc chromate primer. The first coat may be "flash dried" while the second coat shall be stoved.

12.3.3 After application of the primer, two coats of finishing synthetic enamel paint shall be applied, each coat followed by stoving. The second finishing coat shall be applied after inspection of first coat of painting.

12.3.4 The exterior and interior colour of the paint in case of new substations shall preferably be RAL 7032 for all equipment, marshalling boxes, junction boxes, control cabinets, panels etc. unless specifically mentioned under respective sections of the equipments. Glossy white colour inside the equipments /boards /panels/junction boxes is also acceptable. The exterior colour for panels shall be matching with the existing panels in case of extension of a substation. Each coat of primer and finishing paint shall be of slightly different shade to enable inspection of the painting. A small quantity of finishing paint shall be supplied for minor touching up required at site after installation of the equipments.

12.3.5 In case the contractor proposes to follow his own standard surface finish and protection procedures or any other established painting procedures, like electrostatic painting etc., the procedure shall be submitted during detailed engineering for Employer's review & approval.

12.3.6 The colour scheme as given below shall be followed for Fire Protection and Air Conditioning systems

S.No.	PIPE LINE	Base colour	Band colour
Fire Protection System			
1	Hydrant and Emulsifier system pipeline/NIFPS	FIRE RED	-
2	Emulsifier system detection line – water	FIRE RED	Sea Green
3	Emulsifier system detection line –Air	FIRE RED	Sky Blue
4	Pylon support pipes	FIRE RED	

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Air Conditioning Plant			
5	Refrigerant gas pipeline – at compressor suction	Canary Yellow	-
6	Refrigerant gas pipeline – at compressor discharge	Canary Yellow	Red
7	Refrigerant liquid pipeline	Dark Admiralty Green	-
8	Chilled water pipeline	Sea Green	-
9	Condenser water pipeline	Sea Green	Dark Blue

The direction of flow shall be marked by → (arrow) in black colour.



Base Colour Direction of flow Band Colour

12.3.7 For aluminium casted surfaces, the surface shall be with smooth finish. Further, in case of aluminium enclosures, the surface shall be coated with powder (coating thickness of 60 microns) after surface preparation for painting. For stainless steel surfaces, no painting is envisaged.

12.3.8 Band colour is required for Emulsifier system detection line only if both water and air detection lines are present at the same substation. Further, band colour shall be applied at an interval of 2 meters approx. along the length and minimum width of band shall be 25mm.

13.0 Deleted.

14.0 TOOLS

14.1 Deleted.

14.2 SPECIAL TOOLS AND TACKLES

The bidder shall supply all special tools and tackles required for Operation and maintenance of equipment. The special tools and tackles shall only cover items which are specifically required for the equipment offered and are proprietary in nature. The list of special tools and tackles, if any, shall be finalized during detail engineering and the same shall be supplied without any additional cost implication to the Employer.

14.3 Deleted.

15.0 AUXILIARY SUPPLY

15.1 The auxiliary power for station supply, including the equipment drive, cooling system of any equipment, air-conditioning, lighting etc shall be designed for the specified Parameters as under. The DC supply for the instrumentation and PLCC system shall also conform the parameters as indicated in the following table:

Normal Voltage	Variation in Voltage	Frequency in HZ	Phase/Wire	Neutral connection
415V	± 10%	50 ± 5%	3/4 Wire	Solidly Earthed.

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240V	± 10%	50 ± 5%	1/2 Wire	Solidly Earthed.
220V	190V to 240V	DC	Isolated 2 wire System	-
110V	95V to 120V	DC	Isolated 2 wire System	-
48V	--	DC	2 wire system (+) earthed	-

Combined variation of voltage and frequency shall be limited to ± 10%.

15.2 Pickup value of binary input modules of Intelligent Electronic Devices, Digital protection couplers, Analog protection couplers shall not be less than 50% of the specified rated station auxiliary DC supply voltage level.

16.0 SUPPORT STRUCTURE (ONLY OF CIRCUIT BREAKER)

16.1 The equipment support structures shall be suitable for equipment connections at the first level i.e 14.0-meter, 8.0-meter, 5.9 meter and 4.6 meter from plinth level for 765kV, 400kV, 220kV and 132kV substations respectively. All equipment support structures shall be supplied alongwith brackets, angles, stools etc. for attaching the operating mechanism, control cabinets & marshalling box (wherever applicable) etc.

16.2 The minimum vertical distance from the bottom of the lowest porcelain/polymer part of the bushing, porcelain/polymer enclosures or supporting insulators to the bottom of the equipment base, where it rests on the foundation pad shall be 2.55 metres.

17.0 CLAMPS AND CONNECTORS INCLUDING TERMINAL CONNECTORS (For Lightning Arrester & Wave Trap only)

17.1 All power clamps and connectors shall conform to IS:5561 or other equivalent international standard and shall be made of materials listed below :

Sl. No.	Description	Materials
a)	For connecting ACSR conductors/AAC conductors/ Aluminium tube	Aluminum alloy casting, conforming to designation **4600** of IS:617 and all test shall conform to IS:617
b)	For connecting equipment terminals mad of copper with ACSR conductors/AAC conductors/ Aluminium tube	Bimetallic connectors made from aluminum alloy casting, conforming to designation **4600** of IS:617 with 2mm thick bimetallic liner/strip and all test shall conform to IS:617
c)	For connecting G.I	Galvanised mild steel shield wire

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d)	Bolts, nuts & plain washers	Electro-galvanised for sizes below M12, for others hot dip galvanised.
e)	Spring washers	Electro-galvanised mild steel suitable for atleast service condition-3 as per IS:1573

17.2 Necessary clamps and connectors shall be supplied for all equipment and connections. If corona rings are required to meet these requirements they shall be considered as part of that equipment and included in the scope of work.

17.3 Where copper to aluminum connections are required, bi-metallic 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 parts which are not current carrying or subjected to stress.

17.4 Low voltage connectors, grounding connectors and accessories for grounding all equipment as specified in each particular case, are also included in the scope of Work.

17.5 No current carrying part of any clamp shall be less than 10 mm thick. All ferrous parts shall be hot dip galvanised. Copper alloy liner/strip of minimum 2 mm thickness shall be cast integral with aluminum body or 2 mm thick bi-metallic liner/strips shall be provided for Bi-metallic clamps.

17.6 All casting shall be free from blow holes, surface blisters, cracks and cavities. All sharp edges and corners shall be blurred and rounded off.

17.7 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 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.

17.8 Current carrying parts (500A and above) of the clamp/connector shall be provided with minimum four numbers of bolts preferably for 132kV and above.

17.9 All current carrying parts shall be designed and manufactured to have minimum contact resistance.

17.10 Power Clamps and connectors shall be designed to control corona as per requirement.

17.11 Tests

Clamps and connectors should be type tested on minimum three samples as per

IS:5561 and shall also be subjected to routine tests as per IS:5561. Following type test reports shall be submitted for approval. Type test once conducted shall hold good. The requirement of test conducted within last ten years, shall not be applicable.

i) Temperature rise test (maximum temperature rise allowed is 35°C over 50°C ambient)

ii) Short time current test

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iii) Corona (dry) and RIV (dry) test [for 132kV and above voltage level clamps]

iv) Resistance test and Pullout strength test

v) Cantilever Strength test on bus support clamps & connectors

18.0 CONTROL CABINETS, JUNCTION BOXES, TERMINAL BOXES MARSHALLING BOXES FOR OUTDOOR EQUIPMENT

18.1 All types of boxes, cabinets etc. shall generally conform to & be tested in accordance with IS/IEC 61439-0, as applicable, and the clauses given below:

18.2 Control cabinets, junction boxes, Marshalling boxes & terminal boxes, Out door ACDB cum DCDB panels shall be made of stainless steel of atleast 1.5 mm thick or aluminium enclosure of atleast 1.6 mm thick and shall be dust, water and vermin proof. Stainless steel used shall be of grade SS304 (SS316 for coastal area) or better. 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.

Control cabinets, junction boxes, marshalling boxes & terminal boxes, out-door ACDB cum DCDB panels shall have adequate space/clearance as per guidelines/technical specifications to access/replace any component. Necessary component labelling to be also done on non-conducting sheet.

For CONTROL CABINETS, JUNCTION BOXES, TERMINAL BOXES MARSHALLING BOXES

FOR OUTDOOR EQUIPMENT Junction Box, wire should be as per IS or equivalent IEC with FRLS grade.

Machine laid PU Foam gasket may be permitted for use in Control Cabinets etc.

18.3 A canopy and sealing arrangements for operating rods shall be provided in marshalling boxes / Control cabinets to prevent ingress of rain water.

18.4 Cabinet/boxes with width more than 700 mm 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.

18.5 All doors, removable covers and plates shall be gasketed all around with suitably profiled EPDM/Neoprene/PU gaskets. The gasket shall be tested in accordance with approved quality plan, IS:11149 and IS:3400. Ventilating Louvers, if provided, shall have screen and filters. The screen shall be fine wire mesh made of brass.

Further, the gasketing arrangement shall be such that gaskets are pasted in slots (in door fabrication/gasket itself) in order to prevent ingression of dust and moisture inside the panels so that no internal rusting occurs in panels during the operation of the equipment.

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18.6 All boxes/cabinets shall be designed for the entry of cables 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 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. The Nickel plated glands shall be dust proof, screw on & double compression type and made of brass. The gland shall have provision for securing armour of the cable separately and shall be provided with earthing tag. The glands shall conform to BS:6121.

18.7 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.

18.8 LED based illumination of minimum 9 watts 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.

18.9 All control switches shall be of MCB/rotary switch type and Toggle/piano switches shall not be accepted.

18.10 Earthing of the cabinet shall be ensured by providing two separate earthing pads. The earth wire 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.

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

18.12 The following routine tests alongwith the routine tests as per IS:5039 shall also be conducted:

i) Check for wiring
ii) Visual and dimension check

18.13 The enclosure of bay marshalling kiosk, junction box, terminal box and control cabinets shall conform to IP-55 as per IS/IEC60947 including application of 1kV rms for 1 (one) minute, after IP-55 test.

19.0 Deleted.

20.0 TERMINAL BLOCKS AND WIRING

20.1 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.

20.2 Terminal blocks shall be 650V grade and have continuous rating to carry the maximum expected current on the terminals and non-breakable type.

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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 the terminal blocks shall be non-disconnecting stud type except for the secondary junction boxes of Current Transformer and Voltage Transformer.

20.3 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.

20.4 The terminal 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.

20.5 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.

20.6 The terminal blocks shall be of extensible design, multilayer terminal arrangement is not allowed in any junction box (Common MB, Individual MB, JB etc.). There should be sufficient space at both sides of terminals so that ferrule number of wires / TB numbers are clearly visible during wire removal or insertion.

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

20.8 The terminal blocks shall be fully enclosed with removable covers of transparent, nondeteriorating 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.

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

a) All circuits except CT/PT circuits	Minimum of two of 2.5 sq mm copper flexible.
b) All CT/PT circuits	Minimum of 4 nos. of 2.5 sq mm copper flexible.

20.10 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.

20.11 Atleast 20 % spare terminals shall be provided on each panel/cubicle/box and these spare terminals shall be uniformly distributed on all terminals rows.

20.12 There shall be a minimum clearance of 250 mm between the First/bottom row of terminal block and the associated cable gland plate for outdoor

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ground mounted marshalling box and the clearance between two rows of terminal blocks shall be a minimum of 150 mm.

20.13 The Contractor 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

21.0 LAMPS & SOCKETS

21.1 **Lamps & Sockets**

All lamps shall use a socket base as per IS-1258, except in the case of signal lamps.

All sockets (convenience outlets) shall be suitable to accept both 5 Amp & 15 Amp pin round Standard Indian plugs. They shall be switched sockets with shutters.

21.2 **Hand Lamp:**

A 240 Volts, single Phase, 50 Hz AC plug point shall be provided in the interior of each cubicle with ON-OFF Switch for connection of hand lamps.

21.3 **Switches and Fuses:**

21.3.1 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 / switch fuse 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.

21.3.2 All fuses shall be of HRC cartridge type conforming to relevant IS 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 of the fuse rating and voltage.

22.0 **BUSHINGS, HOLLOW COLUMN INSULATORS, SUPPORT INSULATORS**:

22.1 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-60168 and IEC-60273. The insulators shall also conform to IEC-60815 as applicable.

The bidder may also offer composite hollow insulators, conforming to IEC-61462.

22.2 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.

22.3 Glazing of the porcelain shall be uniform brown in colour, free from blisters, burrs and similar other defects.

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22.4 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.

22.5 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.

22.6 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.

22.7 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.

22.8 Void

22.9 Deleted.

23.0 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.

23.1 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.

23.2 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.

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b) Motor shall be capable at giving rated output without reduction in the expected life span when operated continuously in the system having the particulars as given in Clause 15.0 of this Section.

23.3 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 under Clause 15.0 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.

23.4 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.

23.5 TESTING AND COMMISSIONING

An indicative list of tests is given below. Contractor shall perform any additional test based on specialities of the items as per the field Q.P./Instructions of the equipment Contractor or Employer without any extra cost to the Employer. The Contractor shall arrange all instruments

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required for conducting these tests alongwith calibration certificates and shall furnish the list of instruments to the Employer for approval.

(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

SECTION-GENERAL TECHNICAL REQUIREMENTS (GTR)

ANNEXURE-A

CORONA AND RADIO INTERFERENCE VOLTAGE (RIV) TEST

1. General

Unless otherwise stipulated, all equipment together with its associated connectors, where applicable, shall be tested for external corona (for 400kV & 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 132kV and above.

2. 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. 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 carried out in accordance with relevant IEC of respective equipment or NEMA standard Publication No. 107-1964.

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 765kV, 400 kV, 220 KV 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. 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,

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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 3 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 three values at which visible corona (negative or positive polarity) disappears.

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

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 Employer's inspector if, in his opinion, it will not prejudice other test

5. 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.

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SEISMIC WITHSTAND TEST PROCEDURE

The seismic withstanding test on the complete equipment (for 400kV and above) shall be carried out along with supporting structure. Seismic Withstand Test carried out using either lattice or pipe structure is acceptable." **Seismic Calculations certified by NABL Labs shall also be acceptable**

The Bidder shall arrange to transport the structure from his Contractor's premises/ POWERGRID 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 Employer. 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 Employer.

The frequency range for the earthquake spectra shall be as per IEC–62271-300.

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SECTION-GENERAL TECHNICAL REQUIREMENTS (GTR)

ANNEXURE-C

LIST OF GENERAL STANDARDS AND CODES

CODES	TITLE
--	India Electricity Rules
--	Indian Electricity Act
--	Indian Electricity (Supply) Act
--	Indian Factories Act
IS-5	Colors for Ready Mixed Paints and Enamels
IS-335	New Insulating Oils
IS-617	Aluminium and Aluminium Alloy Ingots and Castings for General Engineering Purposes
IS-1448 (P1 to P 145)	Methods of Test for Petroleum and its Products
IS-2071 (P1 to P3)	Methods of High Voltage Testing
IS-12063	Classification of degrees of protection provided by enclosures of electrical equipment
IS-2165 ; P1:1997, P2:1983	Insulation Coordination
IS-3043	Code of Practice for Earthing
IS-6103	Method of Test for Specific Resistance (Resistivity) of Electrical Insulating Liquids
IS-6104	Method of Test for Interfacial Tension of Oil against Water by the Ring Method
IS-6262	Method of test for Power factor & Dielectric Constant of Electrical Insulating Liquids
IS-6792	Method for determination of electric strength of insulating oils
IS-5578	Guide for marking of insulated conductors
IS-11353	Guide for uniform system of marking & identification of conductors & apparatus terminals.
IS-8263	Methods for Radio Interference Test on High voltage Insulators
IS-9224 (Part 1,2&4)	Low Voltage Fuses
IEC-60060 (Part 1 to P4)	High Voltage Test Techniques
IEC 60068	Environmental Test
IEC-60117	Graphical Symbols
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 Hexafloride
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 & Control gear Standards
IEC-60815	Guide for the Selection of Insulators in respect of Polluted Conditions

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ANNEXURE-C

CODES	TITLE
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, C63.3	Specification for Electromagnetic Noise and Field Strength Instrumentation 10 KHz to 1 GHZ
C36.4ANSI-C68.1	Techniquest for Dielectric Tests
ANSI-C76.1/EEE21	Standard General Requirements and Test Procedure for Outdoor Apparatus Bushings
ANSI-SI-4	Specification for Sound Level Meters
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
CSA-Z299.4-1979h	Inspection 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

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ANNEXURE-C

CODES	TITLE
ANSI-CG,1EEE-4	Standard Techniques for High Voltage Testing
IEC 60076	Power transformers
IEC 60076-1	Part 1: General
IEC 60076-2	Part 2: Temperature rise
IEC 60076-3	Part 3: Insulation levels, dielectric tests and external clearances in air
IEC 60076-4	Part 4: Guide to the lightning impulse and switching impulse testing - Power transformers and reactors
IEC 60076-3-1	Part 3-1: Insulation Levels and Dielectric Tests –External Clearances in Air
IEC 60076-5	Part 5: Ability to withstand short circuit
IEC 60076-6	Part 6: Reactors
IEC 60076-7	Part 7: Loading guide for oil-immersed power transformers
IEC 60076-8	Part 8: Application guide
IEC 60076-10	Part 10: Determination of sound levels
IEC 60076-10-1	Part 10-1: Determination of sound levels - Application guide
IEC 60076-11	Part 11: Dry-type transformers
IEC 60076-12	Part 12: Loading guide for dry-type power transformers
IEC 60076-13	Part 13: Self-protected liquid-filled transformers
IEC 60076-14	Part 14: Design and application of liquid-immersed power transformers using high-temperature insulation materials
IEC 60076-15	Part 15: Gas-filled power transformers
IEC 60076-16	Part 16: Transformers for wind turbine applications
IEC 60076-18	Part 18: Measurement of frequency response
IEC 60076-19	Part 19: Rules for the determination of uncertainties in the measurement of losses in power transformers and reactors
IEC 60076-21	Part 21: Standard requirements, terminology, and test code for step-voltage regulators
IEC 60044, BS 3938	Current transformers
IEC 60050	International Electrotechnical Vocabulary
IEC 60050(421)	International Electrotechnical vocabulary- Chapter 421 : Power Transformers and Reactors
IEC 60060	High Voltage test techniques
IEC 60060-1	General definitions and test requirements
IEC 60060-2	Measuring systems
IEC 60071	Insulation co-ordination
IEC 60071-1	Part 1: Definitions, principles and rules
IEC 60071-2	Part 2 : Application guide
IEC 60137	Bushing for alternating voltage above 1000V
IEC 60214	On-Load Tap changers
IEC 255-21-3	Relays vibration

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ANNEXURE-C

CODES	TITLE
IEC 60270	Partial discharge measurements
IEC 60296	Specification for Unused Mineral Oil for Transformers and Switchgear
IEC 60422	Supervision and Maintenance guide for Mineral Insulating Oil in Electrical Equipment
IEC 60475	Method of Sampling Liquid dielectrics
IEC 60529	Classification of Degrees of Protection provided by Enclosures
IEC 60542	Application Guide for On-Load Tap-Changers
IEC 60567	Guide for the Sampling of Gases and of Oil from Oil-filled Electrical Equipment for the Analysis of Free and Dissolved Gases
IEC 60651	Sound Level Meters
IEC 61083	Digital Recorders and Software for High Voltage Impulse testing
IEC 61083-1	Part 1: Requirements for digital recorders in high voltage impulse tests
IEC 61083-2	Part 2: Evaluation of software used for the determination of the parameters of impulse waveforms
CISPR 16	Specification for radio disturbance and immunity measuring apparatus
CISPR 16-1	Radio disturbance and immunity measuring apparatus
CISPR-18	Radio Interference Characteristics of Power Lines and High Voltage Equipment
ISO 9001	Quality system-Model for Quality Assurance in Design /development
Cigre Publication 202	Guidelines for conducting design reviews for transformers 100 MVA and 123 kV and above. August 2002-Cigre Working Group 12.22
WG 12-15	Guide for Customers Specifications for Transformers 100 MVA and 123 kV and above
WG 12 19	Short Circuit Performance of Transformers.
BS-4360	Specification for weldable structural steel
BS-5135	Specification for arc welding of carbon and carbon manganese steels
BS-5500	Specification for unfired fusion welded pressure vessels
IS-3618	Specification for phosphate treatment of iron & steel for protection against corrosion
IS-6005	Code of practice for phosphating of Iron and Steel
ISO-8501	Preparation of steel surface before application of Paints and related product
IEC-60599	Mineral oil impregnated electrical equipment in service – guide to the interpretation of dissolved and free gases analysis
IS-10593	Method of evaluating the analysis of gases in oil filled electrical equipment in service
IS-2099	Bushings for alternating voltages above 1000 volts

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SECTION-GENERAL TECHNICAL REQUIREMENTS (GTR)

ANNEXURE-C

CODES	TITLE
IS-3347 Part I to 8	Dimension for porcelain transformer bushing
DIN-42530	Bushing up to 1000kV from 250A-5000A for liquid filled Transformer
IS-2026 Part 1 to 5	Power transformer
IS-4691	Degrees of protection provided by enclosure for rotating electrical machinery
IEC-60034-5	Degrees of protection provided by integral design of rotating electrical machines(IP Code) classification
IS:325 / IEC -60034	Performance of cooling fan / oil pump motor
IS-13947 part 1 to 5	Specification for low voltage switchgear and control gear
IS:3400	Methods of test for vulcanised rubber
IS:7016 part 1 to 14	Methods of test for coated and treated fabrics
IS:803	Code of practice for design, fabrication and erection of vertical mild steel cylindrical welded oil storage tanks.
IS:3637	Gas operated Relays
IS:335	New Insulating oils – Specification
IEC-62271-203	Gas insulated metal enclosed switchgear for rated voltage above 52kV
IEC-61639	Direct connection between power transformers and gas-insulated metal enclosed switchgear for rated voltages of 52.5 kV and above.
IS:3400 / BS 903 / IS:7016	Air cell (Flexible Air Separator)
IEC 60529 / IP : 55	Degree of protection for cooler control cabinet , MOLG, Cooling fan , oil pump, Buchholz Relay
IEC 60529 / IP : 56	Degree of protection for Pressure Relief Device
IEC 60529 / IP : 43	Degree of protection for Remote tap Changer cubicle (RTCC)
CIRCUIT BREAKERS	
IEC-62271-100	High-voltage switchgear and control gear - Part 100: Alternating current circuit-breakers
IEC-62271-101	High-voltage switchgear and control gear - Part 101: Synthetic testing
IEC-62155	Hollow pressurized and unpressurized ceramic and glass insulators for use in electrical equipment with rated voltages greater than 1000 V
IEC-62271-110	High-voltage switchgear and control gear - Part 110: Inductive load switching
IEC-62271-109	High-voltage switchgear and control gear - Part 110: Inductive load switching
CURRENT TRANSFORMERS, VOLTAGE TRANSFORMERS AND COUPLING CAPACITOR VOLTAGE TRANSFORMERS	
IS-2705- (P1 to P4)	Current Transformers

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SECTION-GENERAL TECHNICAL REQUIREMENTS (GTR)

ANNEXURE-C

CODES	TITLE
IS:3156- (P1 to P4)	Voltage Transformers
IS-4379	Identification of the Contents of Industrial Gas Cylinders
IEC-61869 (Part-1)	Instrument transformers - Part 1: General requirements
IEC-61869 (Part-2)	Instrument transformers - Part 2: Additional requirements for current transformers
IEC-61869 (Part-3)	Instrument transformers - Part 3: Additional requirements for inductive voltage transformers
IEC-61869 (Part-4)	Instrument transformers - Part 4: Additional requirements for combined transformers
IEC-61869 (Part-5)	Instrument transformers - Part 5: Additional requirements for capacitor voltage transformers
IEC-61869 (Part-6)	Instrument transformers - Part 6: Additional general requirements for low-power instrument transformers
IEC-61869 (Part-9)	Instrument transformers - Part 9: Digital interface for instrument transformers
IEC-61869 (Part-102)	Instrument transformers - Part 102: Ferroresonance oscillations in substations with inductive voltage transformers
IEC-61869 (Part-103)	Instrument transformers - The use of instrument transformers for power quality measurement
BUSHING	
IS-2099	Bushings for Alternating Voltages above 1000V
IEC-60137	Insulated Bushings for Alternating Voltages above 1000V
SURGE ARRESTERS	
IS-3070 (PART2)	Lightning arresters for alternating current systems : Metal oxide lightning arrestors without gaps
IEC-60099-4	Metal oxide surge arrestors without gaps
IEC-60099-5	Selection and application recommendation
ANSI-C62.1	IEE Standards for S A for AC Power Circuits
NEMA-LA 1	Surge Arresters
CUBICLES AND PANELS & OTHER RELATED EQUIPMENTS	
IS-722, IS-1248	Electrical relays for power system
IS-3231, 3231 (P-3)	Protection
IS:5039	Distributed pillars for Voltages not Exceeding 1000 Volts
IEC-60068.2.2	Basic environmental testing procedures Part 2: Test B: Dry heat
IEC-60529	Degree of Protection provided by enclosures
IEC-60947-4-1	Low voltage switchgear and control gear
IEC-61095	Electromechanical Contactors for household and similar purposes
IEC-60439 (P1 & 2)	Low Voltage Switchgear and control gear assemblies
ANSI-C37.20	Switchgear Assemblies, including metal enclosed bus
ANSI-C37.50	Test Procedures for Low Voltage Alternating Current Power

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CODES	TITLE
	Circuit Breakers
ANSI-C39	Electric Measuring instrument
ANSI-C83	Components for Electric Equipment
IS: 8623: (Part I to 3)	Specification for Switchgear & Control Assemblies
NEMA-AB	Moulded Case Circuit and Systems
NEMA-CS	Industrial Controls and Systems
NEMA-PB-1	Panel Boards
NEMA-SG-5	Low voltage Power Circuit breakers
NEMA-SG-3	Power Switchgear Assemblies
NEMA-SG-6	Power switching Equipment
NEMA-5E-3	Motor Control Centers
1248 (P1 to P9)	Direct acting indicating analogue electrical measuring instruments & their accessories
Disconnecting switches	
IEC-62271-102	High-voltage switchgear and control gear - Part 102: Alternating current disconnectors and earthing switches
IEC-60265 (Part 1 & 2)	High Voltage switches
ANSI-C37.32	Schedule of preferred Ratings, Manufacturing Specifications and Application Guide for high voltage Air Switches, Bus supports and switch accessories
ANSI-C37.34	Test Code for high voltage air switches
NEMA-SG6	Power switching equipment
PLCC and line traps	
IS-8792	Line traps for AC power system
IS-8793	Methods of tests for line traps
IS-8997	Coupling devices for PLC systems
IS-8998	Methods of test for coupling devices for PLC systems
IEC-60353	Line traps for A.C. power systems
IEC-60481	Coupling Devices for power line carrier systems
IEC-60495	Single sideboard power line carrier terminals
IEC-60683	Planning of (single Side-Band) power line carrier systems
CIGRE	Teleprotection report by Committee 34 & 35
CIGRE	Guide on power line carrier 1979
CCIR	International Radio Consultative Committee
CCITT	International Telegraph & Telephone Consultative Committee
EIA	Electric Industries Association
Protection and control equipment	
IEC-60051: (P1 to P9)	Recommendations for Direct Acting indicating analogue electrical measuring instruments and their accessories
IEC-60255 (Part 1 to 23)	Electrical relays
IEC-60297 (P1 to P4)	Dimensions of mechanical structures of the 482.6mm (19 inches)

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CODES	TITLE
	series
IEC-60359	Expression of the performance of electrical & electronic measuring equipment
IEC-60387	Symbols for Alternating-Current Electricity meters
IEC-60447	Man machine interface (MMI) - Actuating principles
IEC-60521	Class 0.5, 1 and 2 alternating current watt hour metres
IEC-60547	Modular plug-in Unit and standard 19-inch rack mounting unit based on NIM Standard (for electronic nuclear instruments)
ANSI-81	Screw threads
ANSI-B18	Bolts and Nuts
ANSI-C37.1	Relays, Station Controls etc
ANSI-C37.2	Manual and automatic station control, supervisory and associated telemetering equipment
ANSI-C37.2	Relays and relay systems associated with electric power apparatus
ANSI-C39.1	Requirements for electrical analog indicating instruments
MOTORS	
IS-325	Three phase induction motors
IS-4691	Degree of protection provided by enclosure for rotating electrical machinery
IEC-60034 (P1 to P19:)	Rotating electrical machines
IEC-Document 2	Three phase induction motors
(Central Office) NEMA-MGI	Motors and Generators
Electronic equipment and components	
MIL-21B, MIL-833 & MIL-2750	Environmental testing
EC-60068 (P1 to P5)	Printed boards
IEC-60326 (P1 to P2)	Material and workmanship standards
IS-1363 (P1 to P3)	Hexagon head bolts, screws and nuts of product grade C
IS-1364 (P1 to P5)	Hexagon head bolts, screws and nuts of products grades A and B
IS-3138	Hexagonal Bolts and Nuts (M42 to M150)
ISO-898	Fasteners: Bolts, screws and studs
ASTM	Specification and tests for materials
Clamps & connectors	
IS-5561	Electric power connectors
NEMA-CC1	Electric Power connectors for sub station
NEMA-CC 3	Connectors for Use between aluminium or aluminum-Copper Overhead Conductors
Bus hardware and insulators	
IS: 2121	Fittings for Aluminum and steel cored Al conductors for overhead

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CODES	TITLE
	power lines
IS-731	Porcelain insulators for overhead power lines with a nominal voltage greater than 1000 V
IS-2486 (P1 to P4)	Insulator fittings for overhead power lines with a nominal voltage greater than 1000 V
IEC-60120	Dimensions of Ball and Socket Couplings of string insulator units
IEC-60137	Insulated bushings for alternating voltages above 1000 V
IEC-60168	Tests on indoor and outdoor post insulators of ceramic material or glass for Systems with Nominal Voltages Greater than 1000 V
IEC-62155	Hollow pressurized and unpressurized ceramic and glass insulators for use in electrical equipment with rated voltages greater than 1 000 V
IEC-60273	Characteristics of indoor and outdoor post insulators for systems with nominal voltages greater than 1000V
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
IEC-60305	Insulators for overhead lines with nominal voltage above 1000V-ceramic or glass insulator units for ac systems Characteristics of String Insulator Units of the cap and pin type
IEC-60372 (1984)	Locking devices for ball and socket couplings of string insulator units : dimensions and tests
IEC-60383 (P1 and P2)	Insulators for overhead lines with a nominal voltage above 1000 V
IEC-60433	Characteristics of string insulator units of the long rod type
IEC-60471	Dimensions of Clevis and tongue couplings of string insulator units
ANSI-C29	Wet process porcelain insulators
ANSI-C29.1	Test methods for electrical power insulators
ANSI-C92.2	For insulators, wet-process porcelain and toughened glass suspension type
ANSI-C29.8	For wet-process porcelain insulators apparatus, post-type
ANSI-G.8	Iron and steel hardware
CISPR-7B	Recommendations of the CISPR, tolerances of form and of Position, Part 1
ASTM A-153	Zinc Coating (Hot-Dip) on iron and steel hardware
Strain and rigid bus-conductor	
IS-2678	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
ASTM-B 230-82	Aluminum 1350 H19 Wire for electrical purposes

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CODES	TITLE
ASTM-B 231-81	Concentric - lay - stranded, aluminum 1350 conductors
ASTM-B 221	Aluminum - Alloy extruded bar, road, wire, shape
ASTM-B 236-83	Aluminum bars for electrical purpose (Bus-bars)
ASTM-B 317-83	Aluminum-Alloy extruded bar, rod, pipe and structural shapes for electrical purposes (Bus Conductors)
Batteries	
IS:1651	Stationary Cells and Batteries, Lead-Acid Type (with Tubular Positive Plates)
IS:1652	Stationary Cells and Batteries, Lead-Acid Type (with Plante Positive Plates)
IS:1146	Rubber and Plastic Containers for Lead-Acid Storage Batteries
IS:6071	Synthetic Separators for Lead-Acid Batteries
IS:266	Specification for Sulphuric Acid
IS:1069	Specification for Water for Storage Batteries
IS:3116	Specification for Sealing Compound for Lead-Acid Batteries
IS:1248	Indicating Instruments
IS:10918	Vented type nickel Cadmium Batteries
IEC:60896-21&22	Lead Acid Batteries Valve Regulated types – Methods of Tests & Requirements
IEC: 60623	Vented type nickel Cadmium Batteries
IEC:60622	Secondary Cells & Batteries – Sealed Ni-Cd rechargeable single cell
IEC:60623	Secondary Cells & Batteries – Vented Ni-Cd rechargeable single cell
IEC:60896-11	Stationary Lead Acid Batteries – Vented Type – General requirements & method of tests
IEEE-485	Recommended practices for sizing of Lead Acid Batteries
IEEE-1115	Sizing of Ni-Cd Batteries
IEEE-1187	Recommended practices for design & installation of VRLA Batteries
IEEE-1188	Recommended practices for design & installation of VRLA Batteries
IEEE-1189	Guide for selection of VRLA Batteries
Battery Charger	
IS:3895	Mono-crystalline Semiconductor Rectifier Cells and Stacks
IS:4540	Mono-crystalline Semiconductor Rectifier Assemblies and Equipment
IS:6619	Safety Code for Semiconductor Rectifier Equipment
IS:2026	Power Transformers

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CODES	TITLE
IS:2959	AC Contactors for Voltages not Exceeding 1000 Volts
IS:1248	Indicating Instruments
IS:2208	HRC Fuses
IS:13947 (Part-3)	Air break switches, air break disconnectors & fuse combination units for voltage not exceeding 1000V AC or 1200V DC
IS:2147	Degree of protection provided by enclosures for low voltage switchgear and control gear
IS:6005	Code of practice for phosphating of Iron and Steel
IS:3231	Electrical relays for power system protection
IS:3842	Electrical relay for AC Systems
IS:5	Colours for ready mix paint
IEEE-484	Recommended Design for installation design and installation of large lead storage batteries for generating stations and substations
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)
IS-694	PVC insulated cables for working voltages upto and including 1100 Volts
IS-1255	Code of practice for installation and maintenance of power cables, upto and including 33 kV rating
IS-1554 (P1 and P2)	PVC insulated (heavy duty) electric cables (part 1) for working voltage upto and including 1100 V Part (2) for working voltage from 3.3 kV upto and including 11kV
IS:1753	Aluminium conductor for insulated cables
IS:2982	Copper Conductor in insulated cables
IS-3961 (P1 to P5)	Recommended current ratings for cables
IS-3975	Mild steel wires, formed wires and tapes for armouring of cables
IS-5831	PVC insulating and sheath of electric cables
IS-6380	Elastometric insulating and sheath of electric cables
IS-7098	Cross linked polyethylene insulated PVC sheathed cables for working voltage upto and including 1100 volts
IS-7098	Cross-linked polyethyle insulated PVC sheathed cables for working voltage from 3.3kV upto and including 33 kV
IS-8130	Conductors for insulated electrical cables and flexible cords
IS-1753	Aluminum Conductors for insulated cables
IS-10418	Specification for drums for electric cables
IEC-60096 (part 0 to p4)	Radio Frequency cables
IEC-60183	Guide to the Selection of High Voltage Cables

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CODES	TITLE
IEC-60189 (P1 to P7)	Low frequency cables and wires with PVC insulation and PVC sheath
IEC-60227 (P1 to P7)	Polyvinyl Chloride insulated cables of rated voltages up to and including 450/750V
IEC-60228	Conductors of insulated cables
IEC-60230	Impulse tests on cables and their accessories
IEC-60287 (P1 to P3)	Calculation of the continuous current rating of cables (100% load factor)
IEC-60304	Standard colours for insulation for low-frequency cables and wires
IEC-60331	Fire resisting characteristics of Electric cables
IEC-60332 (P1 to P3)	Tests on electric cables under fire conditions
IEC-60502	Extruded solid dielectric insulated power cables for rated voltages from 1 kV upto to 30 kV
IEC-754 (P1 and P2)	Tests on gases evolved during combustion of electric cables
AIR conditioning and ventilation	
IS-659	Safety code for air conditioning
IS-660	Safety code for Mechanical Refrigeration
ARI:520	Standard for Positive Displacement Refrigeration Compressor and Condensing Units
IS:4503	Shell and tube type heat exchanger
ASHRAE-24	Method of testing for rating of liquid coolers
ANSI-B-31.5	Refrigeration Piping
IS:2062	Steel for general structural purposes
IS:655	Specification for Metal Air Dust
IS:277	Specification for Galvanised Steel Sheets
IS-737	Specification for Wrought Aluminium and Aluminium Sheet & Strip
IS-1079	Hot rolled cast steel sheet & strip
IS-3588	Specification for Electrical Axial Flow Fans
IS-2312	Propeller Type AC Ventilation Fans
BS-848	Methods of Performance Test for Fans
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-STD-282	DOP smoke penetration method
ASHRAE-52	Air cleaning device used in general ventilation for removing particle matter
IS:3069	Glossary of Terms, Symbols and Units Relating to Thermal Insulation Materials

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CODES	TITLE
IS:4671	Expanded Polystyrene for Thermal Insulation Purposes
IS:8183	Bonded Mineral Wool
IS:3346	Evaluation of Thermal Conductivity properties by means of guarded hot plate method
ASTM-C-591-69	Standard specification for rigid preformed cellular urethane thermal insulation
IS:4894	Centrifugal Fans
BS:848	Method of Performance Test for Centrifugal Fans
IS:325	Induction motors, three-phase
IS:4722	Rotating electrical machines
IS:1231	Three phase foot mounted Induction motors, dimensions of
IS:2233	Designations of types of construction and mounting arrangements of rotating electrical machines
IS:2254	Vertical shaft motors for pumps, dimensions of
IS:7816	Guide for testing insulation resistance of rotating machines
IS:4029	Guide for testing three phase induction motors
IS: 4729	Rotating electrical machines, vibration of, Measurement and evaluation of
IS:4691	Degree of protection provided by enclosures for rotating electrical machinery
IS:7572	Guide for testing single-phase ac motors
IS:2148	Flame proof enclosure for electrical apparatus
BS:4999(Part-51)	Noise levels
Galvanizing	
IS-209	Zinc Ingot
IS-2629	Recommended Practice for Hot-Dip galvanizing on iron and steel
IS-2633	Methods for testing uniformity of coating of zinc coated articles
ASTM-A-123	Specification for zinc (Hot Galavanizing) Coatings, on products Fabricated from rolled, pressed and forged steel shapes, plates, bars and strips
ASTM-A-121-77	Zinc-coated (Galvanized) steel barbed wire
Painting	
IS-6005	Code of practice for phosphating of iron and steel
ANSI-Z551	Gray finishes for industrial apparatus and equipment
SSPEC	Steel structure painting council
Fire protection system	
--	Fire protection manual issued by tariff advisory committee (TAC) of India
HORIZONTAL CENTRIFUGAL PUMPS	
IS:1520	Horizontal centrifugal pumps for clear, cold and fresh water
IS:9137	Code for acceptance test for centrifugal & axial pumps

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ANNEXURE-C

CODES	TITLE
IS:5120	Technical requirement – Rotodynamic special purpose pumps
API-610	Centrifugal pumps for general services Hydraulic Institutes Standards
BS:599	Methods of testing pumps
PTC-8.2	Power Test Codes - Centrifugal pumps
DIESEL ENGINES	
IS:10000	Methods of tests for internal combustion engines
IS:10002	Specification for performance requirements for constant speed compression ignition engines for general purposes (above 20 kW)
BS:5514	The performance of reciprocating compression ignition (Diesel) engines, utilizing liquid fuel only, for general purposes
ISO:3046	Reciprocating internal combustion engines performance
IS:554	Dimensions for pipe threads where pressure tight joints are required on threads
ASME Power Test Code	Internal combustion engine PTC-17
--	Codes of Diesel Engine Manufacturer's Association, USA
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)
IS:3582	Basket strainers for fire-fighting purposes (cylindrical type)
IS:3589	Electrically welded steel pipes for water, gas and sewage (150 to 2000 mm nominal diameter)
IS:4038	Foot valves for water works purposes
IS:4927	Unlined flax canvas hose for fire fighting

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CODES	TITLE
IS:5290	Landing valves (internal hydrant)
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
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:5572 (Part-I)	Classification of hazardous areas for electrical installations (Areas having gases and vapours)
IS:6362	Designation of methods of cooling for rotating electrical machines
IS:6381	Construction and testing of electrical apparatus with type of protection 'e'
IS:7816	Guide for testing insulation for rotating machine
IS:4064	Air break switches
IEC DOCUMENT 2 (Control Office) 432	Three Phase Induction Motor
VDE 0530 Part I/66	Three Phase Induction Motor
IS:9224 (Part-II)	HRC Fuses
IS:6875	Push Button and Control Switches
IS:694	PVC Insulated cables
IS:1248	Indicating instruments
IS:375	Auxiliary wiring & busbar markings

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CODES	TITLE
IS:2147	Degree of protection
IS:5	Colour Relay and timers
IS:2959	Contactors
PG Test Procedures	
NFPA-13	Standard for the installation of sprinkler system
NFPA-15	Standard for water spray fixed system for the fire protection
NFPA-12A	Standard for Halong 1301 Fire Extinguishing System
NFPA-72E	Standard on Automatic Fire Detectors
--	Fire Protection Manual by TAC (Latest Edition)
NFPA-12	Standard on Carbon dioxide extinguisher systems
IS:3034	Fire of industrial building
--	Electrical generating and distributing stations code of practice
IS:2878	CO2 (Carbon dioxide) Type Extinguisher
IS:2171	DC (Dry Chemical Powder) type
IS:940	Pressurised Water Type
D.G. SET	
IS:10002	Specification for performance requirements for constant speed compression ignition (diesel engine) for general purposes
IS:10000	Method of tests for internal combustion engines
IS:4722	Rotating electrical machines-specification
IS:12063	Degree of protection provided by enclosures
IS:12065	Permissible limit of noise levels for rotating electrical machines
--	Indian Explosive Act 1932
Steel structures	
IS-228 (1992)	Method of Chemical Analysis of pig iron, cast iron and plain carbon and low alloy steels.
IS-802 (P1 to 3)	Code of practice for use of structural steel in overhead transmission line towers
IS-806	Code of practice for use of steel tubes in general building construction
IS-808	Dimensions for hot rolled steel beam, column channel and angle sections
IS-814	Covered electrodes for manual arc welding of carbon of carbon manganese steel
IS-816	Code of Practice for use of metal arc welding for general construction in Mild steel
IS-817	Code of practice for training and testing of metal arc welders. Part 1 : Manual Metal arc welding
IS-875 (P1 to P4)	Code of practice for design loads (other than earthquake) for buildings and structures
IS-1161	Steel tubes for structural purposes

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ANNEXURE-C

CODES	TITLE
IS-1182	Recommended practice for radiographic examination of fusion welded butt joints in steel plates
IS-1363 (P1 to P3)	Hexagonal head bolts, screws & nuts of products grade C
IS-1364	Hexagon head bolts, screws and nuts of product grades A and B
IS-1367 (P1 to P18)	Technical supply condition for threaded steel fasteners
IS-1599	Methods for bend test
IS-1608	Method for tensile testing of steel products
IS-1893	Criteria for earthquake resistant design of structures
IS-1978	Line Pipe
IS-2062	Steel for general structural purposes
IS-2595	Code of practice for Radiographic testing
IS-3063	Single coil rectangular section spring washers for bolts, nuts and screws
IS-3664	Code of practice for ultrasonic pulse echo testing by contact and immersion methods
IS-7205	Safety code for erection of structural steel work
IS-9595	Recommendations for metal arc welding of carbon and carbon manganese steels
ANSI-B18.2.1	Inch series square and Hexagonal bolts and screws
ANSI-B18.2.2	Square and hexagonal nuts
ANSI-G8.14	Round head bolts
ASTM-A6	Specification for General Requirements for rolled steel plates, shapes, sheet piling and bars of structural use
ASTM-A36	Specifications of structural steel
ASTM-A47	Specification for malleable iron castings
ASTM-A143	Practice for safeguarding against embilement of Hot Galvanized structural steel products and procedure for detaching embrilement
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 tower bolts and nuts
ASTM-441	Specification for High strength low alloy structural manganese vanadium steel
ASTM-A572	Specification for High strength low alloy colombium-Vanadium steel of structural quality
AWS D1-0	Code for welding in building construction welding inspection
AWS D1-1	Structural welding code
AISC	American institute of steel construction
NEMA-CG1	Manufactured graphite electrodes

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SECTION-GENERAL TECHNICAL REQUIREMENTS (GTR)

ANNEXURE-C

CODES	TITLE
Piping and pressure vessels	
IS-1239 (Part 1 and 2)	Mild steel tubes, tubulars and other wrought steel fittings
IS -3589	Seamless Electrically welded steel pipes for water, gas and sewage
IS-6392	Steel pipe flanges
ASME	Boiler and pressure vessel code
ASTM-A120	Specification for pipe steel, black and hot dipped, zinc-coated (Galvanized) welded and seamless steel pipe for ordinary use
ASTM-A53	Specification for pipe, steel, black, and hot-dipped, zinc coated welded and seamless
ASTM-A106	Seamless carbon steel pipe for high temperature service
ASTM-A284	Low and intermediate tensile strength carbon-silicon steel plates for machine parts and general construction
ASTM-A234	Pipe fittings of wrought carbon steel and alloy steel for moderate and elevated temperatures
ASTM-S181	Specification for forgings, carbon steel for general purpose piping
ASTM-A105	Forgings, carbon steel for piping components
ASTM-A307	Carbon steel externally threated standard fasteners
ASTM-A193	Alloy steel and stainless steel bolting materials for high temperature service
ASTM-A345	Flat rolled electrical steel for magnetic applications
ASTM-A197	Cupola malleable iron
ANSI-B2.1	Pipe threads (Except dry seal)
ANSI-B16.1	Cast iron pipe flangesand glanged fitting. Class 25, 125, 250 and 800
ANSI-B16.1	Malleable iron threaded fittings, class 150 and 300
ANSI-B16.5	Pipe flanges and flanged fittings, steel nickel alloy and other special alloys
ANSI-B16.9	Factory-made wrought steel butt welding fittings
ANSI-B16.11	Forged steel fittings, socket-welding and threaded
ANSI-B16.14	Ferrous pipe plug, bushings and locknuts with piple threads
ANSI-B16.25	Butt welding ends
ANSI-B18.1.1	Fire hose couplings screw thread
ANSI-B18.2.1	Inch series square and hexagonal bolts and screws
ANSI-B18.2.2	Square and hexagonal nuts
NSI-B18.21.1	Lock washers
ANSI-B18.21.2	Plain washers
ANSI-B31.1	Power piping
ANSI-B36.10	Welded and seamless wrought steel pipe
ANSI-B36.9	Stainless steel pipe
Other civil works standards	

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SECTION-GENERAL TECHNICAL REQUIREMENTS (GTR)

ANNEXURE-C

CODES	TITLE
IS-269	33 grade ordinary portland cement
IS2721	Galvanized steel chain link fence fabric
IS-278	Galvanized steel barbed wire for fencing
IS-383	Coarse and fine aggregates from natural sources for concrete
IS-432 (P1 and P2)	Mild steel and medium tensile steel bars and hard-dawn steel wire for concrete reinforcement
IS-456	Code of practice for plain and reinforced concrete
IS-516	Method of test for strength of concrete
IS-800	Code of practice for general construction in steel
IS-806	Steel tubes for structural purposes
IS-1172	Basic requirements for water supply, drainage and sanitation
IS-1199	Methods of sampling and analysis of concrete
IS-1566	Hard-dawn steel wire fabric for concrete reinforcement
IS-1742	Code of Practice for Building drainage
IS-1785	Plain hard-drawn steel wire for pre-stressed concrete
IS-1786	High strength deformed Steel Bars and wires for concrete reinforcement
IS-1811	Methods of sampling Foundry sands
IS-1893	Criteria for earthquake resistant design of structures
IS-2062	Steel for general structural purposes
IS-2064	Selection, installation and maintenance of sanitary appliances-code of practices
IS-2065	Code of practice for water supply in buildings
IS-2090	High tension steel bars used in pre-stressed concrete
IS-2140	Standard Galvanized steel wire for fencing
IS-2470 (P1 & P2)	Code of practice for installation of septic tanks
IS-2514	Concrete vibrating tables
IS-2645	Integral cement waterproofing compounds
IS-3025 (Part 1 to Part 48)	Methods of sampling and test (Physical and chemical) for water and waste water
IS-4091	Code of practice for design and construction of foundations for transmission line towers and poles
IS-4111 (Part 1 to P5)	Code of practice for ancillary structures in sewerage system
IS-4990	Plywood for concrete shuttering work
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)

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SECTION-GENERAL TECHNICAL REQUIREMENTS (GTR)

ANNEXURE-C

CODES	TITLE
	rame 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 BS:443-1969	Methods for Determination of Mass of zinc coating on zinc coated Iron and Steel Articles
IS:8263	Methods for Radio Interference
IEC:437-1973 NEMA:107-1964 CISPR	Test on High Voltage Insulators
IS:209, BS:3436-1961	Zinc Ingot
IS:398 Part - V IEC:209-1966	Aluminum Conductors for Overhead Transmission Purposes
BS:215(Part-II), IEC:209-1966	Aluminium Conductors galvanized steel reinforced extra high voltage (400 kV and above)
IS:1778, BS:1559-1949	Reels and Drums for Bare Conductors
IS:1521, ISO/R89-1959	Method for Tensile Testing 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/ ASTMA-472-729	Hot dip galvanised coatings on round steel wires
GALVANISED STEEL EARTHWIRE	
IS:1521, ISO/R:89-1959	Method for Tensile Testing 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	Methods for testing Uniformity of Coating of Zinc Coated Articles
IS:4826/ ASTM: A 475-72a BS:443-1969	Hot dip Galvanised Coatings on Round Steel Wires
IS:6745/ BS:443-1969	Method for Determination of mass of Zinc Coating on Zinc coated Iron and Steel Articles.
IS:209/ BS:3463-1961	Zinc ingot
IS:398 (Pt. I to P5:1992)/ BS:215 (Part-II	Aluminum Conductors for overhead transmission purposes

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SECTION-GENERAL TECHNICAL REQUIREMENTS (GTR)

ANNEXURE-C

CODES	TITLE
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 (non-flameproof type)
IS:10322	Specification for flood light
IS:10322	Specification for decorative lighting outfits
IS:10322	Luminaries for street lighting
IS:2418	Tubular fluorescent lamps
IS:9900	High pressure mercury vapour lamps
IS:1258	Specification for Bayonet lamp fluorescent lamp
IS:3323	Bi-pin lamp holder tubular fluorescent lamps
IS:1534	Ballasts for use in fluorescent lighting fittings. (Part-I)
IS:1569	Capacitors for use in fluorescent lighting fittings
IS:2215	Starters for fluorescent lamps
IS:3324	Holders for starters for tubular fluorescent lamps
IS:418	GLS lamps
IS:3553	Water tight electric fittings
IS:2713	Tubular steel poles
IS:280	MS wire for general engg. Purposes
Conduits, Accessories and Junction Boxes	
IS:9537	Rigid steel conduits for electrical wiring
IS:3480	Flexible steel conduits for electrical wiring
IS:2667	Fittings for rigid steel conduits for electrical wiring
IS:3837	Accessories for rigid steel conduits for electrical wiring
IS:4649	Adaptors for flexible steel conduits
IS:5133	Steel and Cast Iron Boxes
IS:2629	Hot dip galvanising of Iron & Steel
Lighting Panels	
IS:13947	LV Switchgear and Control gear(Part 1 to 5)
IS:8828	Circuit breakers for over current protection for house hold and similar installations
IS:5	Ready mix paints
IS:2551	Danger notice plates
IS:2705	Current transformers

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SECTION-GENERAL TECHNICAL REQUIREMENTS (GTR)

ANNEXURE-C

CODES	TITLE
IS:9224	HRC Cartridge fuse links for voltage above 650V(Part-2)
IS:5082	Wrought aluminium and Al. alloys, bars, rods, tubes and sections for electrical purposes
IS:8623	Factory built Assemblies of Switchgear and Control Gear for voltages upto and including 1000V AC and 1200V DC
IS:1248	Direct Acting electrical indicating instruments
Electrical Installation	
IS:1293	3 pin plug
IS:371	Two to three ceiling roses
IS:3854	Switches for domestic and similar purposes
IS:5216	Guide for safety procedures and practices in electrical work
IS:732	Code of practice for electrical wiring installation (system voltage not exceeding 650 Volts.)
IS:3043	Code of practice for earthing
IS:3646	Code of practice of interior illumination part II & III
IS:1944	Code of practice for lighting of public through fares
IS:5571	Guide for selection of electrical equipment for hazardous areas
IS:800	Code of practice for use of structural steel in general building construction
IS:2633	Methods of Testing uniformity of coating on zinc coated articles
IS:6005	Code of practice for phosphating iron and steel
	INDIAN ELECTRICITY ACT
	INDIAN ELECTRICITY RULES
LT SWITCHGEAR	
IS:8623 (Part-I)	Specification for low voltage switchgear and control gear assemblies
IS:13947 (Part-I)	Specification for low voltage switchgear and control gear, Part 1 General Rules
IS:13947 (part-2)	Specification for low voltage switchgear and control gear, Part 2 circuit breakers
IS:13947 (part-3)	Specification for low voltage switchgear and control gear. Part 3 Switches, Disconnectors, Switch-disconnectors and fuse combination units
IS:13947 (part-4)	Specification for low voltage switchgear and control gear. Part 4 Contactors and motors starters
IS:13947 (part-5)	Specification for low voltage switchgear and control gear. Part 5 Control-circuit devices and switching elements
IS:13947 (part-6)	Specification for low voltage switchgear and control gear. Part 6 Multiple function switching devices
IS:13947 (part-7)	Specification for low voltage switchgear and control gear. Part 7 Ancillary equipments
IS:12063	Degree of protection provided by enclosures

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SECTION-GENERAL TECHNICAL REQUIREMENTS (GTR)

ANNEXURE-C

CODES	TITLE
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)	Low voltage fuses for voltage not exceeding 1000V AC or 1500V DC Part 1 General Requirements
IS:13703 (part 2)	Low voltage fuses for voltage not exceeding 1000V AC or 1500V DC Part 2 Fuses for use of authorized persons
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

Note: If any standard is expired or does not exist anymore than other standard which has substituted it, shall be applicable.

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SECTION-GENERAL TECHNICAL REQUIREMENTS (GTR)

Annexure-G

MQP & INSPECTION LEVEL REQUIREMENT

Sl. No	Item / Equipment	Reference document for inspection	Inspection Level
A.01	LT Transformer /Power Transformer/ Reactor/ Converter Transformer/ Filter Reactor	MQP/ITP	IV
A.02	Bushing	MQP	IV
A.03	Insulating Oil	POWERGRID TS	III
A.04	Oil storage tank for transformers	MQP	III
A.05	Nitrogen injection based explosion prevention system	FAT/ITP	III
A.06	On Line oil drying system for transformers	POWERGRID TS	II**
A.07	On Line DGA and moisture monitoring system	POWERGRID TS	II**
A.08	Flow sensitive conservator isolation valve	POWERGRID TS	II**
A.09	Oil Filtration Machine	MQP	III
B.01	Circuit Breakers	MQP	IV
B.02	Current Transformers	MQP/ITP	IV
B.03	CVT/PT/IVT	MQP	IV
B.04	Isolators	MQP/ITP	IV
B.05	Surge Arrestors	MQP/ITP	III
B.06	Line Trap & Air Core Reactor	MQP/ITP	III
B.07	Point On switching device (CSD) for Circuit Breaker (wherever required)	FAT/ITP	IV
C.01	STATCOM including Valve, valve base electronics, DC capacitor, series reactor and all accessories	ITP	IV
C.02	Mechanically switched Reactor bank (3-ph) including all accessories (MSR Branches)	ITP	IV
C.03	Mechanically switched Capacitor bank (3-ph) including all accessories (MSC Branches)	ITP	IV
C.04	Harmonic Pass filters	ITP	IV
C.05	HT Capacitor	MQP	IV
D.01	Thyristor Valve	FAT/ITP	III
D.02	PLC Capacitors for HVDC	FAT/ITP	III
D.03	Valve Cooling system for	FAT/ITP	III

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SECTION-GENERAL TECHNICAL REQUIREMENTS (GTR)

Annexure-G

Sl. No	Item / Equipment	Reference document for inspection	Inspection Level
	HVDC		
D.04	AC/DC Filter Resistors	ITP	III
D.05	DC Current and Voltage measuring device for HVDC	FAT/ITP	III
D.06	Maintenance platform for valve hall	POWERGRID TS	II
D.07	Optical signal column for FSC	FAT/ITP	II
E.01	GIS including spares	MQP/ITP	IV
E.02	Dew Point Meter for GIS	POWERGRID TS	I*
E.03	Portable Partial Discharge monitoring system for GIS	POWERGRID TS	I*
E.04	Partial Discharge Monitoring System (Online) for GIS	ITP	III
E.05	PEB Structure and Puf Panels	MQP	III
F.01	Substation Automation system	FAT/MQP	III
F.02	Event Logger	POWERGRID TS	III
F.03	PLCC equipment Viz PLCC Terminal ,Carrier equipment, Protection Coupler , Coupling Device but excluding EPAX / HF Cable	MQP	III
F.04	Control & Relay Panels	MQP	III
G.01	EHV Cables	MQP/ITP	III
G.02	Power Cables & Control Cables	MQP	III
G.03	Cable Joints (11 kV and above)	POWERGRID TS	II
G.04	Cable Lugs & Glands / Clamps/Terminations	POWERGRID TS	I
H.01	LT Switchgear & ACDB/DCDB/MLDB/ELDB	MQP	III
H.02	Battery	POWERGRID TS	II
H.03	Battery Charger	MQP	III
H.04	UPS & Voltage Stablizer	MQP/FAT	III
H.05	D. G. Set	FAT/ITP	III
H.06	Lighting Panel	POWERGRID TS	II
H.07	Lighting Poles	POWERGRID TS	II
H.08.1	Lighting Fixtures, Lighting Earthwire, Switches / sockets, Conduits, Lamps & fans including exhaust fans	POWERGRID TS	I
H.8.2	Solar based LEDs System including street light/pole solar panel, Inverter controller/LED fixture	FAT	III
H.09	MS/GI /PVC Pipes for cable	POWERGRID TS	I

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Annexure-G

Sl. No	Item / Equipment	Reference document for inspection	Inspection Level
	trenches and lighting		
H.10	Outdoor Receptacle	POWERGRID TS	I
H.11	Split A.C/window A.C./ precision AC/ Kiosk AC/ Cascade AC/ Tower AC	POWERGRID TS	I
H.12	Occupancy sensors for control of lighting	POWERGRID TS	I
H.13	Solar based street lighting pole including Solar Panel, Inverter, Controller, etc.	POWERGRID TS	III
H.14	Junction Box / Lighting Switch Boards / Bay MB / Portable Flood Light Panel	POWERGRID TS	II
H.15	Lighting transformer	POWERGRID TS	II
I.01	SF6 gas processing unit, SF6 gas Leakage detector, SF6 gas Analyzer	POWERGRID TS	I*
I.02	SF6 Gas	POWERGRID TS	I
I.03	Spark Gap	FAT/ITP	III
I.04	Time synchronizing Equipment (GPS Clock)	POWERGRID TS	I
I.05	Galvanized Cable trays	POWERGRID TS	II
I.06	Video Monitoring System	FAT/ITP	I
I.07	Public Address System (All Components)	POWERGRID TS	I
I.08	Building Management System (All components)	POWERGRID TS	I
I.09	Access Control System (All Components)	POWERGRID TS	I
I.10	Video Display system/ Video Projection system	POWERGRID TS	I
I.11	VESDA (smoke detector)	POWERGRID TS	I
I.12	High Mast Pole	MQP	III
J.01	Aluminium ladder	POWERGRID TS	I
J.02	Hume Pipes	POWERGRID TS	I
J.03	Castle Key	POWERGRID TS	I
J.04	Water Treatment plant (All components).	POWERGRID TS	I
J.05	Furniture	POWERGRID TS	I
J.06	DOL Starter	POWERGRID TS	I
J.07	Oil Sample Bottles and Syringe	POWERGRID TS	I
J.08	Test & Measuring Equipment, T&P	POWERGRID TS	I*
K.01	EOT Crane	POWERGRID TS	II

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Annexure-G

Sl. No	Item / Equipment	Reference document for inspection	Inspection Level
K.02	Boom Crane/Golf Cart/Platform Truck/Man Lift/ Fork Lift/ Lifts	POWERGRID TS	II
L.00	Fire Protection System		
L.001	Panels, Hydro pneumatic tank for fire protection system.	POWERGRID TS	III
L.002	Deluge valve, Strainers, MS/GI pipes, Pumps, motors, air compressor, and other valves, Diesel Engines	POWERGRID TS	II
L.003	Others	POWERGRID TS	I
M.00	HVAC SYSTEM		
M.001	Air Cooled Chiller	POWERGRID TS	III
M.002	Pump	POWERGRID TS	II
M.003	Air Handling Unit	POWERGRID TS	II
M.004	Fan Filter Unit With Centrifugal Blower	POWERGRID TS	II
M.005	Axial Flow Fan	POWERGRID TS	II
M.006	Main Climate Control Unit (Dehumidifier)	POWERGRID TS	I
M.007	Dampers	POWERGRID TS	II
M.008	Fire Dampers	POWERGRID TS	II
M.009	Pressure Gauge, Thermometers, Other Instruments / Sensors	POWERGRID TS	I
M.010	Grill, Diffuser, Jet Nozzle, Louvers etc	POWERGRID TS	I
M.011	Ducting	POWERGRID TS	III
M.012	M S Pipe	POWERGRID TS	II
M.013	Pipe Insulation Material	POWERGRID TS	I
M.014	Duct Insulation Material	POWERGRID TS	I
M.015	Underdeck Insulation Material	POWERGRID TS	I
M.016	Gate Valve & Non Return valve	POWERGRID TS	I
M.017	Y Strainer	POWERGRID TS	II
M.018	Ball Valve/ Motorised Butterfly Valve/ Balancing Valve	POWERGRID TS	I
M.019	Closed Expansion Tank	POWERGRID TS	II
M.020	Air Separator	POWERGRID TS	I
M.021	MCC /PLC /Electrical Panels	POWERGRID TS	III
M.022	Propeller Fan/ Conduit	POWERGRID TS	II
M.023	Air Filter/ Mixing Valve with Thermostat	POWERGRID TS	I

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SECTION-GENERAL TECHNICAL REQUIREMENTS (GTR)

Annexure-G

Sl. No	Item / Equipment	Reference document for inspection	Inspection Level
N.01	SDH Equipment	FAT/ITP	IV
N.02	Termination Equipment Primary/ DI Multiplexer	FAT/ITP	IV
N.03	DACS	FAT/ITP	IV
N.04	Optical Amplifier	FAT/ITP	IV
N.05	FODP including pigtail, Joint Box, FDMS	FAT/ITP	II
N.06	IMPS	FAT/ITP	IV
N.07	Optical bypass switch	FAT/ITP	IV
N.08	Air Purifier	FAT/ITP	I
N.09	Patch cord & connector	FAT/ITP	I
N.10	NMS	FAT/ITP	IV
N.11	OPGW Cable	MQP/ITP/FAT	III
N.12	Hardware Fittings for OPGW cable	MQP/ITP	III
N.13	DCPS	FAT/ITP	III
N.14	Radio Links	FAT/ITP	III
N.15	SMPS based DC Power Supply (DCPS) system	FAT/ITP	III
N.16	WAMS (PMU & Accessories)	FAT/ITP	III
N.17	PUF Shelter	FAT/ITP	III
N.18	Aerial OFC/UGOFC/ADSS/FO Cable	FAT/ITP	III
N.19	DWDM	FAT/ITP	III
N.20	OTN	FAT/ITP	III
N.21	MPLS-TP Equipment	FAT/ITP	III
N.22	L2 Switch	FAT/ITP	III
N.23	IP-MPLS Router	FAT/ITP	III
N.24	HDPE Pipes	POWERGRID TS	II
N.25	Equipment Cabinets	POWERGRID TS	II
N.26	Main Distribution Frame	POWERGRID TS	I
N.27	Telephone system, EPAX, Telephone wires, Telephone sockets	POWERGRID TS	I
N.28	Fibre Optic Cable	MQP	III
N.29	Hardware Fittings for Fibre Optic cable	MQP	III
O.01	Re-rollers of MS/HT Angle Section and galvanized tower parts.	MQP	IV
O.02	Conductor	MQP	IV
O.03	Hardware fittings and Conductor & Earthwire Accessories	MQP	IV
O.04	Earth wire	MQP	IV

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SECTION-GENERAL TECHNICAL REQUIREMENTS (GTR)

Annexure-G

Sl. No	Item / Equipment	Reference document for inspection	Inspection Level
O.05	Insulator	MQP	IV
O.06	Bolts & Nuts of Gr 8.8 / 8	MQP	IV
O.07	Mono Pole	MQP	IV
O.08	Foundation Bolts & Anchor Bolts	POWERGRID TS	III
O.09	D-shackle/ Hanger / Links and associated Special bolt/nuts	MQP	III
O.10	Span Marker, Obstruction lights and Wind Measuring Equipment	POWERGRID TS	III
O.11	MS ROD rolled by Approved Re-roller of POWERGRID	MQP	III
O.12	MS ROD rolled by Approved steel producers of POWERGRID	POWERGRID TS	I
O.13	Spring Washers & Pack washers	POWERGRID TS	II
O.14	Bolts & Nuts Gr up to 5.6/5	POWERGRID TS	II
O.15	ACD & Barbed wire for ACD/Bird guard	POWERGRID TS	II
O.16	Danger Plate /Phase Plate / Number Plate / Circuit plate	POWERGRID TS	I
O.17	Sub Station Structure (lattice/pipe type)	MQP	III
O.18	Clamps & Connecters (including equipment connectors)	MQP	III
O.19	MS/ GI Flat, rod type, pipe type and other earthing material.	POWERGRID TS	II
O.20	Aluminium Tube & Busbar materials	POWERGRID TS	II
O.21	Pipe Type & Counter Poise Earthing	POWERGRID TS	II
O.22	DTS System	POWERGRID TS	II

For Equipment where requirement of MQP is envisaged, ITP/FAT will be followed If sourced from off shore. For items required in S/S or T/L or TELECOM/LD&C , same inspection level as specified shall be followed for all the cases.

*MICC for test and measuring equipment (inspection level I or II) shall be issued only after actual verification/ demonstration of satisfactory performance at site.

** Though level-2 items, CIP/MICC can be issued also on review of TCs and visual inspection of these item.

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ANNEXURE-J

LIST OF THE MAKES FOR WHICH TYPE TEST REPORTS NOT REQUIRED TO BE SUBMITTED

Sl. No.	ITEM DESCRIPTION	MAKE
A.	***Substation Accessories [Type Testing is not envisaged]***	
1.	Out door receptacles	CGL/B&C/BCH/Sakti, Chennai/Indo Asian/AVAIDS
2.	Trefoil clamp	Moulded Fibre Glass Products, Calcutta
3.	Diesel Engine	Cummins/Ruston & Hornsby/Greaves Cotton/Kirloskar/Mahindra/Ashok Leyland
4.	Alternator	AVK/KIRLOSKAR/STAMFORD/ Leroy Somer
5.	Motors	KEC/Siemens/NGEF/Crompton/ABB
6.	Cable Glands	Sunil & Co./Arup/ Comet/QPIE
7.	Junction Box	Sarvana/ECS/C&S/Vikas/ Maktel/Unilac/Jasper/ Amara raja/AVAIDS
8.	EPAX	MATRIX, BPL
9.	ACSR Conductor (Bersimis/Moose/Zebra)	Sterlite/Apar/HVPL/Sharavathy/Hiren Aluminium Ltd./Smita/Deepak Cables/Polycab wires/Cabcon/JSK
10.	AAC Conductor (BULL)	Sterlite/Cabcon /JSK
11.	G.S. Earthwire	Sharavathy/Bharat Wire Ropes/Ramswarup
12.	Lighting Fixtures	Phillips/CGL/Bajaj /Havels
13.	Lighting Transformer	Gujarat-Plug-In
14.	Lighting Panels	Vikas/Makel/Nitya/AVAIDS
15.	MCCB/ACB/Protective relays of LT Switchgear Boards	All approved makes as per Compendium of Vendors
16.	EOT Crane	Reva
B.	***ACCESSORIES FOR TRANSFORMER & REACTOR [Earlier approved type test reports is applicable and not required to be submitted]***	
17.	BUCHHOLZ RELAY *[Upto 765kV Transformer & Reactor]*	(i) M/S CEDESPE, ITLAY [Model Type-EE 3 (Plug & Socket type)]/ (ii) M/s VIAT INSTRUMENTS PVT. LTD.KOLKATA [Model type-GOR-3M (Plug & Socket type)]
18.	PRESSURE RELIEF DEVICE *[Upto 765kV Transformer & Reactor]*	(i) M/S SUKRUT UDYOG, Pune [Model type-T-6-MS-15-SHB-PS (Plug & Socket type)] /
19.	MAGNETIC OIL LEVEL GAUGE *[Upto 765kV Transformer & Reactor]*	(i) M/S SUKRUT UDYOG PUNE [Model type-SO-HE-10-M-ATMS-PS (Plug & Socket type)], [Model Type:- SO-6-M-P-PS (Plug & Socket type)]/
20.	AIR CELL (FLEXIBLE AIR SEPARATOR) *[Upto 765kV Transformer & Reactor]*	Type test of following makes are not to be submitted (i) M/S PRONAL FRANCE / (ii) FUJIKURA,JAPAN / (iii) PRONAL ASIA, MALAYSIYA / (iv) SHENYANG HONGDA GENERAL RUBBER FACTORY /

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ANNEXURE-J

LIST OF THE MAKES FOR WHICH TYPE TEST REPORTS NOT REQUIRED TO BE SUBMITTED

Sl. No.	ITEM DESCRIPTION	MAKE
		(v) BAODING XINKE RUBBER PRODUCT INSTITUTE, CHINA / (vi) M/S ZENITH INDUSTRIAL RUBBER PRODUCTS PVT. LTD. THANE/ (vii) M/S UNIRUB TECHNO PUNE
21.	OTI & WTI *[Upto 765kV Transformer & Reactor]*	(i) M/S PRESIMEASURE BANGALORE [Model type-1005A
22.	OIL PUMP *[Upto 765kV Transformer & Reactor]*	(i) FLOWWELL PUMPS & METERS, BANGALORE [Model type-1220D, 1250D
23.	COOLING FAN AND MOTOR ASSEMBLY *[Upto 765kV Transformer & Reactor]*	(i) M/S MARATHON LTD KOLKATA [Model Type:-36M/K75-P8, 0.7kW, 725RPM, 22J/K37-P6, 0.25kW, 940RPM,AFF 915103, 0.625kW, 550RPM]
24.	Sudden Pressure Relay *[Upto 765kV Transformer & Reactor]*	(i) Qualitrol [Model/Drawing No.900-003-02 CS-46518, 900-003-32 CS-46369] / (ii) Shenyang KEQI Electrical Equipment Co. Ltd. [Model/Drawing No.SYJ9-50-25TH]
25.	BUCHHOLZ RELAY *[Upto 400kV Transformer & Reactor]*	(i) M/S CEDASPE, ITALY [Model type-EE3 (Plug & Socket type)]/ (ii) VIAT INSTRUMENTS [Model type-GOR-3M (Plug & Socket type)]
26.	PRESSURE RELIEF DEVICE *[Upto 400kV Transformer & Reactor]*	(i) M/S SKURUT UDYOG, PUNE [Model type-T-6-MS-15-SHB-PS (Plug & Socket type)]
27.	MAGNETIC OIL LEVEL GAUGE *[Upto 400kV Transformer & Reactor]*	(i) M/S SUKRUT UDYOG PUNE [Model type-SO-HE-10-M-ATMS-PS (Plug & Socket type)], [Model Type: SO-6-M-P-PS (Plug & Socket type)]/ (ii) M/S YOGYA ENTERPRISES, JHANSI [Model type-SO-10 (Plug & Socket type)]
28.	AIR CELL (FLEXIBLE AIR SEPARATOR) *[Upto 400kV Transformer & Reactor]*	Type test of following makes are not to be submitted (i) M/S THE RUBBER PRODUCTS MUMBAI / (ii) M/S UNIRUB TECHNO PUNE / (iii) M/S PRONAL FRANCE/ (iv) M/S ZENITH INDUSTRIAL RUBBER PRODUCTS PVT. LTD. THANE / (v) SHENYANG HONGDA GENERAL RUBBER FACTORY, CHINA
29.	Sudden Pressure Relay *[Upto 400kV Transformer & Reactor]*	(i) Qualitrol [Model/Drawing No.900-003-02 CS-46518, 900-003-32 CS-46369] / (ii) VIAT INSTRUMENTS [Model/Drawing No.950 / (iii) Shenyang KEQI Electrical Equipment Co. Ltd. [Model/Drawing No.SYJ9-50-25TH]
30.	RIP Bushing (52kV, 3150A)	ABB Micafil, Switzerland [Model/Drawing No. 1ZCD073617 (Rev F)]
31.	RIP Bushing (420kV, 1250A)	ABB, SWEDEN [Model/Drawing No.1ZSC005378A0001 REV. K]
32.	RIP Bushing (245kV, 1250A)	ABB, SWEDEN [Model/Drawing No.1ZSC005416A0001 (Rev. D)]
33.	RIP Bushing (245kV, 2000A)	ABB, SWEDEN [Model/Drawing No.1ZSC005373A0001

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ANNEXURE-J

LIST OF THE MAKES FOR WHICH TYPE TEST REPORTS NOT REQUIRED TO BE SUBMITTED

Sl. No.	ITEM DESCRIPTION	MAKE
		(Rev. C)]
34.	RIP Bushing (420kV, 1250A)	HSP Germany [Model/Drawing No.327470]
35.	RIP Bushing (245kV, 2000A)	HSP Germany [Model/Drawing No.329260]
36.	RIP Bushing (52kV, 3150A)	HSP Germany [Model/Drawing No.329280]
37.	RIP Bushing (420kV, 1250A)	Izolyator, Russia [Model/Drawing No.686354.603]
38.	RIP Bushing (245kV, 2000A)	Izolyator, Russia [Model/Drawing No.686353.602]
39.	RIP Bushing (52kV, 3150A)	Izolyator, Russia [Model/Drawing No.686351.601]
40.	RIP Bushing (145kV, 1250A)	Izolyator, Russia [Model/Drawing No.686352.604]
41.	RIP Bushing (420kV, 1250A)	TRENCH, CHINA [Model/Drawing No.ECT 707 (C2)]
42.	RIP Bushing (245kV, 2000A)	TRENCH, CHINA [Model/Drawing No.ECT 617 (C3)]
43.	RIP Bushing (245kV, 1250A)	TRENCH, CHINA [Model/Drawing No.ECT 616 (C3)]
44.	RIP Bushing (145kV, 1250A)	TRENCH, CHINA [Model/Drawing No.ECT 516 (C3)]
45.	RIP Bushing (52kV, 1250A)	TRENCH, CHINA [Model/Drawing No.ECT 415 (C3)]
46.	RIP Bushing (52kV, 3150A)	TRENCH, CHINA [Model/Drawing No.ECT 419 (C3)]
47.	RIP Bushing (420kV, 1250A)	Xian China [Model/Drawing No.75706 (Rev 09)]
48.	RIP Bushing (245kV,2000A)	Xian China [Model/Drawing No.75618 (Rev 09)]
49.	RIP Bushing (52kV, 3150A)	Xian China [Model/Drawing No.75366 (Rev 03)]
50.	RIP Bushing (52kV, 3150A)	Xian China [Model/Drawing No.75332 (Rev 08)]
51.	OIP Bushing (800kV, 2500A)	ABB, SWEDEN [Model / Drawing No. GOE-2550-1600-2500-0.6-B, 1ZSC026186-AAM REV. H]
52.	OIP Bushing (420kV, 2500A)	ABB, SWEDEN [Model / Drawing No.GOE-1425-1150-2500-0.6, 1ZSC026186-AAL REV. F]
53.	OIP Bushing (800kV, 2500A)	TBEA, CHINA [Model / Drawing No.TBEA-500-765T-A0035-01, REV. 02]
54.	OIP Bushing (420kV, 2500A)	TBEA, CHINA [Model / Drawing No.TBEA-500-765T-A0035-02, REV. 02]
55.	OIP Bushing (420kV, 2500A)	TRENCH, CHINA [Model / Drawing No.OT-738-1 (C 5)]
56.	OLTC (500MVA, 765kV ICT)	MR Germany [Model/Drawing No. MI 1503 72.5/RC- 12231WR]
57.	OLTC (500MVA, 400kV ICT)	Easun MR, Chennai [Model/Drawing No. 3 x MI 1200 300/D 10.19.3W]
58.	OLTC (220kV & below rating transformer)	BHEL, Bhopal [Model/Drawing No.MIII 600 110/C 10.19.3W]
C.	***TESTING EQUIPMENT FOR TRANSFORMER & REACTOR***	
59.	Oil BDV Test Kit	Baur [Model/Drawing No.DTA 100C]
60.	Oil BDV Test Kit	Megger [Model/Drawing No.OTS 100AF]

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ANNEXURE-J

LIST OF THE MAKES FOR WHICH TYPE TEST REPORTS NOT REQUIRED TO BE SUBMITTED

Sl. No.	ITEM DESCRIPTION	MAKE
61.	Online Dissolved Gas (Multi-gas) and Moisture Analyser	A Eberle GmbH & Co. KG [Model/Drawing No.HYDROCAL 1008]
62.	Online Dissolved Gas (Multi-gas) and Moisture Analyser	Ningbo Ligong Online Monitoring Technology Co. LTD [Model/Drawing No.MGA2000]
63.	Online Dissolved Gas (Multi-gas) and Moisture Analyser	GE Energy [Model/Drawing No.KELMAN TRANSFIX]
64.	Online Dissolved Gas (Multi-gas) and Moisture Analyser	Qualitrol Company LLC [Model/Drawing No.SERVERON TM 8]
65.	On line Insulating Oil Drying System	CEE DEE Vacuum Equipment Pvt. Ltd. [Model/Drawing No.TRANSDRY CD-002]
66.	On line Insulating Oil Drying System	PTSS [Model/Drawing No.PTSS-TDS1GA6XS]
67.	Portable Dissolved Gas Analysis of Insulating Oil	GE Energy [Model/Drawing No. KELMAN TRANSPORT X]

NOTES:-

1. For sub-station accessories mentioned at Sr. No. A above, model specific separate approval of type test report is not required.

2. For Transformer/Reactor accessories & testing equipment mentioned at Sr. No. B & C above, wherever, model/drawing no. is specified separate approval of type test report and drawing/documents is not required, thus requirement of type test report validity of 10 years is not applicable.

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Sl. No.	Power System Equipment	Minimum Local Content (%)
1	Power Transformers (up to 765 kV, including Generator Transformers)	60
2	Instrument Transformer (up to 765 kV)	60
3	Transformer Oil Dry Out System (TODOS)	60
4	Reactors up to 765 kV	60
5	Oil Impregnated Bushing (Up to 400kV)	60
6	Resin Insulated Paper (RIP) bushings (up to 145 kV)	50
7	Circuit Breakers (up to 765kV AC-Alternating Current)	60
8	Disconnectors, Isolators (up to 765kV AC)	60
9	Wave Trap (up to 765kV AC)	60
10	Oil Filled Distribution Transformers up to & including 33kV [Cold Rolled Grain Oriented (CRGO)/Amorphous, Aluminium/Copper wound]	60
11	Dry type Distribution Transformers up to & including 33kV (CRGO/Amorphous, Aluminium/Copper wound)	60
12	Conventional conductor	60
13	Accessories for conventional conductors	60
14	High Temperature/High Temperature Low Sag (HTLS) conductors (such as Composite core, GAP, ACSS, INVAR, AL59) and accessories	60
15	Optical ground wire (OPGW)- all designs	60
16	Fiber Optic Terminal Equipment (FOTE) for OPGW	50
17	OPGW related Hardware and accessories	60
18	Remote Terminal Unit (RTU)	50
19	Power Cables and accessories up to 33kV	60
20	Control cables including accessories	60
21	XLPE cables up to 220kV	60
22	Substation Structures	60
23	Transmission Line Towers	60
24	Porcelain (Disc/Long Rod) Insulators	60
25	Bus Post Insulators (Porcelain)	60
26	Porcelain Disc Insulators with Room Temperature Vulcanisation (RTV) coating	50
27	Porcelain Long Rod Insulators with Room temperature Vulcanisation (RTV) coating	50
28	Hardware Fittings for porcelain Insulators	60
29	Composite/Polymeric Long Rod Insulators	60
30	Hardware Fittings for Polymer Insulators	60
31	Bird Flight Diverter (BFD)	60
32	Power Line Carrier Communication (PLCC) system (up to 800kV)	60
33	Gas Insulated Switchgear (up to 400kV AC)	60
34	Gas Insulated Switchgear (above 400kV AC)	50
35	Surge/Lightning Arrester (up to 765kV AC)	60
36	Power Capacitors	60
37	Packaged Sub-station (6.6kV to 33kV)	60
38	Ring Main Unit (RMU) (up to 33kV)	60

39	Medium Voltage (MV) GIS panels (up to 33kV)	60
40	Automation and Control system/Supervisory Control and Data Acquisition (SCADA) system in Power system	50
41	Control and Relay panel (including Digital/Numerical relays)	50
42	Electrical motors 0.37kW to 1MW	60
43	Energy meters excluding smart meters	50
44	Control and Power cables and accessories (up to 1.1kV)	60
45	Diesel Generating (DG) set	60
46	DC system (DC Battery & Battery Charger)	60
47	AC and DC Distribution board	60
48	Indoor Air Insulated Switchgear (AIS) up to 33kV	60
49	Poles (PCC, PSCC, Rolled Steel Joist, Rail Pole, Spun, Steel Tubular)	60
50	Material for Grounding/earthing system	60
51	Illumination system	60
52	Overhead Fault Sensing Indicator (FSI)	50
53	Power Quality Meters	50
54	Auxiliary Relays	50
55	Load Break Switch	50
56	Cranes, EOT cranes, gantry crane & chain pulley blocks, etc	60
57	Elevator	60
Fire Protection and Detection system		
58	Motor driven fire water pumps	60
59	Diesel engine driven fire water pumps	60
60	Hydrant system	60
61	High velocity water spray system	60
62	Medium velocity water spray system	60
63	Foam Protection system	60
64	Inert gas flooding system	60
65	Fire tenders	60
66	Portable fire-extinguishers	60

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Annexure-S1

METHODOLOGY FOR SUPPLY, INSTALLATION & SIZING OF CABLES

Supply of 1.1kV grade Cables:

- The quantities of various type of 1.1kV grade power and control cables shall be assessed by POWERGRID. The Sizes of 1.1 kV grade Control cables to be adopted for installation is enclosed at Appendix I . For Sizes of Power Cable, Clause 1.1.4 of Section Power and control Cable rev 06 is amended at Appendix-II

  For Applications in addition to those specified, appropriate cable size shall be considered by the contractor with prior approval of Employer during execution stage

- Supply of 1.1kV grade power and control cables of various sizes shall be as per unit quantities mentioned in BPS.

- The Cables from Control Room/SPR/ACDB/DCDB/BMK to Equipment Marshalling box (MB)/Local control Cubical (LCC) shall be considered under the BPS item for supply of cables.

- The Interpole cables between AIS Instrument Transformer (CT/CVT), Surge Arrester and associated Junction Box shall be as per unit quantities mentioned in BPS.

- The Interpole cables between Circuit Breaker, Isolator and associated Marshalling box shall be deemed to be included in price of Equipment.

Installation of 1.1kV grade Cables:

- The quantity of Installation of cables is to be assessed by the contractor for the complete scope of work specified in Section project.

- The installation of 1.1kV grade power and control cables (including interpole cable of Equipment & illumination cables) shall be quoted in "LOT" basis.

- Supply and installation of Cable accessories like lugs, glands etc. for entire cabling work shall be deemed to be included in Installation charges of cables quoted by contractor in Bid price schedule.

- No variation shall be admissible on account of Installation of Cables/supply and installation of associated accessories, irrespective of variation (either positive or negative) in supply quantity of Cable specified in BPS.

Extra Consumption of 1.1 kV Power and control cables.

The Contractor shall make every effort to minimise wastage of the cables during installation. The Permitted Overall scarp/wastage shall be limited to 0.50% of actual supplied quantity for each size of cables. Any wastage more than the above limit shall be recovered from the contractor. All balance unused cables shall be returned to the employer by rewinding in separate drums for each size with discrete markings on drums.

Cut pieces of Cables having length less than following shall be considered for Scrap. The Contractor shall dispose of the scrap (if any), at their own cost :

1.) **Length less than 20 M**
   - **a)** Control Cable (3C, 5C, 7C & 10 Core)
   - **b)** Power Cable(2CX 6Sqmm,4CX6Sqmm, 4CX16Sqmm)

2.) **Length less than 50 M**
   - **a)** Control Cable having more than 10 Cores
   - **b)** Power Cable of sizes above 16 Sq mm

For Illumination purpose, ACP's shall be supplied as per BPS. From ACP to luminous all the required cables, accessories(including lugs and gland for cables between MLDB & ACP) , SLP/JB etc as required shall be assessed and supplied by the contractor. The price of these items shall be deemed to be included in price of luminaries.

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Appendix-I: Control Cable Sizes

S.No.	From	To	Proposed Cable size
1.	CB MB	CRP panels	i) 10CX2.5Sq mm ii) 19CX1.5 Sq mm iii) 27CX 1.5 Sq mm
2.	CB MB	Earth switch MB	i) 3CX 2.5 Sqmm ii) 5C X2.5 Sq mm
3.	Isolator MB	Earth switch MB	10CX2.5Sq mm
4.	Isolator MB	CRP panels	19CX1.5 Sq mm
5.	CT	CT JB	i) 5C X2.5 Sq mm ii) 10C X2.5 Sq mm
6.	CT JB	CRP panels	i) 5C X2.5 Sq mm ii) 10C X2.5 Sq mm
7.	CVT	CVT JB	i) 5C X2.5 Sq mm ii) 10C X2.5 Sq mm
8.	CVT JB	CRP panels	i) 5C X2.5 Sq mm ii) 10C X2.5 Sq mm
9.	LA	LA JB	3C X2.5 Sq mm
10.	LA JB	CRP panels	5C X2.5 Sq mm
11.	Reactor MB/CMB (for 1-Ph)	CRP panels	i) 3CX2.5Sq mm ii) 5CX2.5 Sq mm iii) 19CX 1.5 Sq mm iv) 27CX 1.5 Sq mm v) Paired Cables
12.	ICT MB/CMB (for 1-Ph)	CRP panels	i) 3CX2.5Sq mm ii) 5CX2.5 Sq mm iii) 19CX 1.5 Sq mm iv) 27CX 1.5 Sq mm v) Paired Cables

Note:

i) For Applications in addition to those specified, appropriate cable size shall be considered by the contractor with prior approval of Employer during execution stage.

ii) GTP of 1.5 Sq mm Cable shall be submitted during detailed engineering stage for employers approval.

iii) In case, more nos. of runs or larger sizes of cables are required between two points based on design calculations, same shall deemed to be included in the scope of bidder.

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Appendix-II Power cable sizes.

S.No.	From	To	Existing Cable size	Cable type
1.	Main Switch Board	LT Transformer	2-1C X 630 mm^2 :For each phase 1-1C X 630 mm^2 : for neutral	XLPE
2.	Main Switch Board	AC Distribution Board	2-3½C X 300 mm^2	XLPE
3.	Main Switch Board	Oil Filtration Unit	1-3½C X 300 mm^2	XLPE
4.	Main Switch Board	Colony Lighting	1-3½C X 300 mm2	XLPE
5.	Main Switch Board	HVW pump LCP	1-3½C X 300 mm2	XLPE
6.	Main Switch Board	Main Lighting distribution board	2-3½C X 300 mm2	XLPE
7.	AC Distribution Board	D.G. Set AMF Panel	For 500 kVA DG set: 2-3½C X 300 mm2 For 250 kVA DG set: 1-3½C X 300 mm2	XLPE
8.	AC Distribution Board	Emergency Lighting distribution board	3½C X 70mm2 :For 765/400kV S/s 3½C X 35mm2 :For 400/220kV S/s	PVC
9.	AC Distribution Board	ICT MB	3½C X 70mm2 :For 765/400kV S/s 3½C X 35mm2 :For 400/220kV S/s	PVC
10.	AC Distribution Board	Bay MB	3½C X 70mm2 :For 765/400kV S/s 3½C X 35mm2 For 400/220kV S/s	PVC
11.	Bay MB	AC Kiosk	1-4C X 16 mm2	PVC
12.	AC Distribution Board	Battery Charger 220 V	1-3½C X 70 mm2	PVC

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Annexure-S1

13.	AC Distribution Board	Battery Charger 48 V	1-3½C X 35 mm	PVC
14.	DCDB	Battery	2-1C X 150 mm2	PVC
15.	DCDB	Battery Charger	2-1C X 150 mm2	PVC
16.	DCDB	Protection/PLCC panel	1-4C X 16 mm2 : 765/400kV S/s 1-4C X 6 mm2: 400/220kV S/s	PVC
17.	Main Lighting DB	Lighting panels(Indoor)	1-3½C X 35 mm2	PVC
18.	Main Lighting DB	Lighting panels (outdoor)	1-3½C X 70 mm2	PVC
19.	Main Lighting DB	Receptacles (Indoor)	1-3½C X 35 mm2	PVC
20.	Main Lighting DB	Receptacles (Outdoor)	1-3½C X 70 mm2	PVC
21.	Lighting Panel	Sub lighting panels	These Cables shall be included in Price of item for Lighting fixture	PVC
22.	Lighting Panel	Street Lighting Poles	These Cables shall be included in Price of item for Lighting fixture	PVC
23.	Lighting Panel/ Sub lighting panels	Lighting Fixtures (Outdoor)	These Cables shall be included in Price of item for Lighting fixture	PVC
24.	Bay MB	Equipment	1-4C X 16 mm^2 : For CB 1-4C X 6 $mm^{2:}$ For Isolator/earths switch 1-2C X 6 : For CT/CVT	PVC
25.	ELDB	Lighting panel	3½C X 70mm^2 :For 765/400kV S/s 3½C X 35mm2 :For 400/220kV S/s	

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SECTION 4

GUARANTEED AND TECHNICAL PARTICULARS FOR 765kV CIRCUIT BREAKER

Bidder shall furnish the technical parameters for offered circuit breaker in the below mentioned format **after award of contract.**

1. GENERAL

a)	Name of the Manufacturer	.....	.....
b)	Country of Manufacturer	.....	.....
c)	Type of Circuit Breaker	.....	.....
d)	Manufacturer's type designation	.....	.....
e)	Standard Applicable	.....	.....
f)	Rated Voltage (kV rms)	.....	.....
g)	Rated Current	.....	.....
	i. Under normal condition (A)	.....	.....
	ii. Under site condition (A)	.....	.....
h)	Rated frequency (Hz)	.....	.....
i)	Number of poles	.....	.....
j)	Whether 3 pole or single pole unit	.....	.....
k)	Whether All The 3 poles ganged electrically or mechanically	.....	.....
l)	Whether dead tank or live tank design	.....	.....
m)	Type of installation	.....	.....
n)	No. of break per pole	.....	.....
		.....	.....
o)	Latching Current		

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2. GUARANTEED RATINGS

a) Rated short circuit breaking current	.....	.....
i. Symmetrical component at highest system voltage (kA)	.....	.....
ii. DC Component (%)	.....	.....
iii. Asymmetrical breaking current at highest system voltage (kA)	.....	.....
b) Rated Making Capacity	.....	.....
i. At higher rated voltage (kAp)	.....	.....
ii. At lower rated voltage (kAp)	.....	.....
	.....	.....
c) (i) Maximum Total break time under any duty condition for any current upto rated breaking current with limiting conditions of voltage and pressure (ms)		
ii. Rated break time	.....	.....
d) Closing time (ms)	.....	.....
	.....	.....
e) Minimum opening time under any condition with limiting voltage and pressure (ms)		
	.....	.....
f) Maximum opening time under any condition with limiting voltage and pressure (ms)		
	.....	.....
g) Maximum close open time under any condition with limiting voltages and pressures (ms)		
h) First pole to clear factor	.....	.....
i) Short time current rating (kA) for 1s	.....	.....
j) Rated operating duty	.....	.....

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k) Maximum braking capacity under kilometric faults and rated TRV characteristic (kAp)	.....	.....
l) Maximum breaking capacity under phase opposition (kAp)	.....	.....
m) Maximum line charging breaking current with temporary over voltage upto 1.4 p.u. (A)	.....	.....
n) Maximum over voltage (p.u.) on switching transformer on no load and corresponding charging current	.....	.....
o) Maximum period between closing of first contact & last contact in a pole (ms)	.....	.....
p) Maximum pole discrepancy (ms)	.....	.....
q) Maximum arc duration and corresponding current under lockout pressure	.....	.....
r) Pre-insertion resistor	.....	
i. Value/ pole (ohms) / with tolerance	.....	.....
ii. Minimum and maximum duration of insertion per pole (ms)	.....	.....
iii. Thermal rating for the C-1m-O-CO-2m-C-1m-O-CO for terminal fault considering maximum resistance and	.....	.....
iv. Thermal rating for the same duty as (iii) above for reclosing against trapped charges	.....	.....
s) Small fault current breaking capacity (kAp)	.....	.....
t) Maximum temperature rise for main contacts over design ambient temperature of 50°C	.....	.....
u) Rated voltage & pick up range for trip coil (V)	.....	.....
v) Rated voltage & pick up range for closing coil (V)	.....	.....
w) Rated pressure and limits of pressure of operating mechanism	.....	.....
x) Rated pressure and limits of pressure of extinguishing medium	.....	.....
y) Minimum dead time for		
i. Three phase reclosing (ms)	.....	.....

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ii. Single phase reclosing (ms) …… ……

3. DIELECTRIC WITHSTAND OF COMPLETE BREAKER

a) One minute dry & wet power frequency withstand voltage

i. Between live terminal and ground (kVrms) …… ……

ii. Between terminals with breaker contacts open (kV rms) …… ……

b) 1.2/50- micro second impulse withstand test voltage

i. Between live terminals and ground(kVp) …… ……

ii. Between terminals with breaker contacts open (kVp) …… ……

c) 250/2500 micro second switching surge withstand test voltage

i. Between live terminals and ground (kVp) …… ……

ii. Between terminals with breaker contacts open (kVp) …… ……

d) Corona extinction voltage (kV rms) …… ……

e) Maximum radio interference voltage (micro V) at 1.1 Ur/_/3 …… ……

f) Total creepage distance

i. To ground (mm) …… ……

ii. Between terminals (mm) ……

4. OPERATING MECHANISM

a) Type of operating mechanism for

i. Closing …… ……

ii. Opening …… ……

b) Manufacturer's type designation …… ……

c) Normal power consumption (W) at rated voltage of …… ……

i. Trip coil …… ……

ii. Closing coil …… ……

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4.1 Spring charged mechanism

a)	Number of close open operations possible after failure of AC supply to motor	……	……
b)	Time required for motor to charge the closing spring (min)	……	……
c)	Whether indication of spring charged condition provided in central control cabinet	……	……

5. TYPE OF BREAKERS

5.1 SF6 Circuit Breakers

a)	Quantity of SF6 per pole (m3) at rated pressure	……	……
b)	Guaranteed max. leakage rate per year	……	……
c)	Rated pressure of SF6 in operating chamber	……	……
d)	Limit of pressure at which breaker operates correctly (kg/ cm2)	……	……
e)	Standard to which SF6 gas complies	……	……
f)	Whether 20% spare SF6 gas stores in unused gas cylinder, included in proposal	……	……
g)	Compacity & filling ration of containers in which SF6 gas would be shipped (m3)	……	……
h)	Whether breakers are dispatched filled with SF6 or required to be filled at site	……	……
i)	Type and make of SF6 pipe coupling used	……	……
j)	Type and make of mandatory maintenance equipment		
	i. SF6 gas filling and evacuation trolley (portable)	……	……
	ii. SF6 gas drying, filling, evacuating equipment and its capacity	……	……
	iii. Operating analyzer type and make	……	……
	iv. SF6 gas leak detector	……	……
k)	Parameters of SF6 gas for initial filling & satisfactory operation		
	i. Density	……	……
	ii. Dielectric strength/ kVmm	……	……
	iii. Acidity (ppm)	……	……
	iv. Water content (ppm)	……	……
	v. Oil content (ppm)	……	……
	vi. Condensation temperature ^{o}C)	……	……
	vii. Resistivity (Ohm-cm)	……	……

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l)	Whether details of SF6 gas viz test methods, handling etc. enclosed	……	……
m)	Type and material of gasket used to ensure gas tight joints for		
	i. Metal to metal joints	……	……
	ii. Metal to porcelain joints	……	……
n)	Method of housing SF6 gas compressors and equipment		
	i. At circuit breaker	……	……
	ii. In control cubicle	……	……
o)	Type and make of		
	i. Densimeter	……	……
	ii. Pressure gauge	……	……
p)	Densimeter Settings		
	i. Lockout	……	……
	ii. Alarm	……	……
q)	Minimum time interval between each make/ break operation (ms)	……	……

5.2 GENERAL

a)	Whether OGA drawing enclosed	……	……
b)	Weight of complete 3 phase breaker for foundation design (kg)	……	……
c)	Weight of heaviest part of breaker (kg)	……	……
d)	Impact loading for foundation design	……	……
e)	Seismic level for which breaker is designed	……	……
f)	Minimum safety clearance from earthed objects	……	……
g)	Noise level in (dB) at base of the breaker	……	……
h)	Minimum clearance in air		
	i. Between live parts (mm)	……	……
	ii. Live parts to earth (mm)	……	……
	iii. Live parts to ground level (mm)	……	……

6. CONSTRUCTIONAL DETAILS

a)	Whether arcing contacts provided	……	……
b)	Type and material of main contacts and arcing contacts	……	……
c)	Contact pressure on main contacts (kg/cm2)	……	……

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d) Contact separation in arcing position (mm) …… ……

e) Contact separation in open position (mm)

   i. Main contacts …… ……

   ii. PIR contacts …… ……

f) Whether pressure relief device for each of the gas chamber of SF6 CB provided …… ……

g) Rate of contact travel

   i. Opening (m/sec) …… ……

   ii. Closing (m/sec) …… ……

h) Whether the making & breaking contacts are hermetically sealed …… ……

i) Type and capacity of device used to obtain uniform voltage distribution between breaks …… ……

j) Overvoltage withstand capability of grading components (kV/mms)

   i. Continuous …… ……

   ii. 10 minutes …… ……

   iii. 1 minute …… ……

   iv. 5 seconds …… ……

k) Number of auxiliary contacts per pole provided for Owner's use …… ……

l) Rated voltage of auxiliary contacts (V) …… ……

m) Current rating of auxiliary contacts

   i. Continuous (A) …… ……

   ii. DC breaking with 20 ms time constant (A) …… ……

n) Whether auxiliary contacts silver plated …… ……

o) Whether support structure included in supply …… ……

p) Height of support structure …… ……

q) Material of support structure …… ……

r) Standard to which the design of support structure conforms …… ……

s) Whether foundation bolts for breakers and cabinets included in scope of supply. …… ……

7. DETAILED LITERATURE

   i. Type test reports as per IEC-56 …… ……

   ii. Factory test report & / or filed test report in case of reactor switching duty …… ……

   iii. Details of operating mechanism …… ……

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iv. Drawing of breaker of support structure	.....	.....
v. Calculations for compressed	.....	.....
vi. Details of SF6 gas filling	.....	.....
vii. Details of SF6 gas leak detector	.....	.....
viii. Precautions in use of SF6 gas	.....	.....
ix. Leaflets & literature bringing out salient features of equipment offered	.....	.....
x. Schematic diagrams of switching mechanism for closing resistor showing the duration of insertion alongwith calculation for thermal rating of closing resistors	.....	.....
xi. Whether drawings/data data furnished as per cl.12 of chapter switchgear (CB)	.....	.....
xii. Method of checking of voltage distribution devices at site enclosed	.....	.....
xiii. Details alongwith a complete catalogue of operation analyzer enclosed	.....	.....
xiv. Data on capabilities of circuit breaker in terms of time and number of operations at duties ranging from 100% fault currents to load currents of the lowest possible value without requiring any maintenance or checks	.....	.....
xv. Effect of non simultaneity between contact within a pole or between poles and also show how it is covered in the guaranteed rated break time.	.....	.....
xvi. Details and type of filters used in interrupter assembly and also the operating experience with such filters	.....	.....
xvii. Curves supported by test data indicating the opening time under close open operation with combined variation of trip coil voltage & pneumatic/ hydraulic pressure	.....	.....
xviii. All duty requirements specified alongwith adequate test reports	.....	.....

CONTROL CABINETS

1. Manufacturer's Name	.....	.....
2. Indoor/ Outdoor application	.....	.....
3. Design ambient air temperature (deg. C)	.....	.....
4. Standards applicable	.....	.....
5. Thickness of sheet steel (mm) and whether cold	.....	.....

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rolled or hot rolled		
6. Degree of protection provided	.....	.....
7. Bill of material for all the equipment mounted on control cabinet giving the following details	.....	.....
a) Make and type	.....	.....
b) Applicable Standard	.....	.....
c) Voltage rating	.....	.....
d) Current rating	.....	.....
e) Duty class, if applicable	.....	.....
f) Manufacturers catalogue No.	.....	.....
g) Total heat load of cabinet (for purpose of ventilation requirement)	.....	.....
8. Colour of finish paint IS:5	.....	.....
a) Outside	.....	.....
b) Inside	.....	.....
9. Control Wiring	.....	.....
(a) Size of conductor	.....	.....
i. For CT circuits	.....	.....
ii. For other circuits	.....	.....
b) Conductor Solid/ Standard	.....	.....
c) Number of Strands/ conductor	.....	.....
10. Terminal Blocks	.....	.....
(a) Make & type	.....	.....
b) Current rating	.....	.....
i) Power terminals (A)	.....	.....
ii) Other terminals (A)		
11. Space Heater Rating at 240 V AC	.....	.....
12. Control cabinet drawing showing the following		
a) Outline dimensions, floor openings, floor/wall/ pedestal fixing arrangements, weights etc.	.....	.....
b) Front view, inside view showing the mounting arrangement of various equipment	.....	.....
13. Schematic/ Wiring diagram of control cabinet enclosed	.....	.....
14. Interconnection drawing showing cable, connections to the control cabinet enclosed	.....	.....
15. Type test report to verify design of protection enclosed	.....	.....

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16. Details of terminal rows:

i) Whether arranged vertical or horizontal	.....	.....
ii) Clearance from adjacent components	.....	.....
iii) Distance between rows	.....	.....
iv) Whether transparent protection cover provided	.....	.....

BUSHING/SUPPORT INSULATOR

1.Manufacturer's Name	.....	.....
2.Type	.....	.....
3.Applicable Standards		
i) Height	.....	.....
ii. Diameter (Top)	.....	.....
iii. Diameter (Bottom)	.....	.....
4.Total Creepage distance (mm)	.....	.....
5.Rated voltage (kV)	.....	.....
6.Power frequency withstand voltage for 1 Min. (kVrms) dry and wet	.....	.....
7. 1.2/50 micro sec. Impulse withstand voltage (kVp)	.....	.....
8. 250/2500 micro sec. Switching impulse withstand voltage (kVp) dry and wet	.....	.....
9.Corona Extinction voltage (kV)	.....	.....
10.Weight (kg)	.....	.....
11. Max. Allowable span (mm)	.....	.....
12. Cantilever Strength (kg)	.....	.....
13. OGA drawing enclosed	.....	.....

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ANNEXURE – A

SCHEDULE OF TECHNICAL DEVIATIONS

Bidder shall list below all technical deviation clause wise w.r.t. tender specifications:

S.No.	Section/ Page No.	Clause No.	Deviation	Reason / Justification

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: Tenderer's Stamp & Signature

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SECTION-5

Checklist

1	**Technical Qualifying Requirement**		
1.1	The bidder to furnish relevant documents for meeting the qualifying requirement. Performance certificates shall be submitted in English. Translated pages should be attested by the ultimate customer, if attested only by the bidder it shall be notarized.	Confirmed	Yes/No
1.2	The bidder's scope includes supply and services such as Supervision of installation, Testing and commissioning.	Confirmed	Yes/No
2	**Un-priced BOQ**		
2.1	Confirm that all items have been quoted separately. (If any item has not been quoted, the same shall be specifically brought out with technical reasons thereof) Record the same in schedule of technical deviations.	Confirmed	Yes/No
3	**Technical**		
3.1	Minimum Number of auxiliary contacts on each Circuit Breaker - Besides requirement of technical specification, the manufacturer shall wire up 10 NO + 10 NC contacts of each phase/ pole exclusively for purchaser's use and shall be wired up to common marshalling box of 765kV CB.	Confirmed	Yes/No
4	**Technical Deviations**		
4.1	Confirm that the Complete systems have been offered as per the requirements of Technical Specification and Nil Deviation sheet, Annexure-A has been submitted. Deviations mentioned elsewhere in the bid will not be considered.	Confirmed	Yes/No
	General		
5	All equipment being supplied shall conform to Guaranteed Technical Particulars as per technical specification and applicable IS / IEC	Confirmed	Yes/No
6	Powergrid standard approval on 765 kV Circuit Breaker drawings.	Confirmed	Yes/No
7	Type test Reports (Already approved by Power grid and not older than 10 years from the date as mentioned in section-1)	Confirmed	Yes/No
8	MQP available (Approved with validity date)	Confirmed	Yes/No
9	Compliance to clause 1.3.3 (Type test) of section-1 of this specification.	Confirmed	Yes/No
10	Performance Certificate as per TQR	Enclosed	Yes/No

Date:
Contact Details: Bidder's Stamp & Signature

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BHARAT HEAVY ELECTRICALS LIMITED
TRANSMISSION PROJECTS ENGINEERING MANAGEMENT

DOCUMENT No.	TB-431-316-001B	Rev. No.	00		Prepared	Checked	Approved
TYPE OF DOC.	TECHNICAL SPECIFICATION			NAME	GV	JK	VK
TITLE				SIGN			
	420kV, 245kV, 145kV, 72.5kV CIRCUIT BREAKER			DATE	10.01.25	14.01.25	15.01.25
				GROUP	TBEM	W.O. No	431

CUSTOMER	POWERGRID Corporation of India Ltd (PGCIL)
PROJECT	1. 765kV AIS Pkg SS-46T for (a) Establishment of 765/400/220kV Barmer-I including 400kV, 2x125 MVAr Reactor; (b) Extn at 765kV Sirohi for termination of Barmer-I PS– Sirohi PS 765 kV D/c line; (c) Extn of 400kV Fatehgarh-III for termination of Fatehgarh-III (Section-2) PS - Barmer-I PS 400 kV D/c line. 2. 765kV AIS Pkg SS-47T for (a) Establishment of 765/400/220/132kV Kurawar Substation (New) including 1x125MVAr 420kV (3-Ph)Bus Reactor, (b) Extn of 400kV Shujalpur for termination of 400kVD/C Shujalpur – Kurawar TL, (c) Extn of 400kV Ashtha S/s for LILO of one circuit of Indore-Itarsi 400 kV D/c line at Ashtha & for termination of Kurawar-Ashtha 400 kV D/c line and (d) Extn of 765kV Mandsaur for termination of Mandsaur – Kurawar 765 kV D/c line. 3. Substation Package SS43T for (a) Establishment of 765/400/ 220kV Mandsaur S/s and (b) Extn. of 765kV Indore (PG) for termination of Mandsaur PS - Indore (PG) 765 kV D/c Line associated with "Transmission system for evacuation of power from Rajasthan REZ Ph-IV (Part-2 : 5.5GW) Jaisalmer/Barmer Complex)Part-C"

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CONTENTS

Section	Description	No. of Sheets
1.	Scope, Specific Technical Requirements and Quantities Annexure- 1 – 3, Bill of Quantities	
2.	Equipment Specification	
3.	Project Details and General Technical Specification	
4.	Guaranteed Technical Particulars **(To be submitted at Contract Stage)**	
5.	Check List **(To be submitted at Tender Stage)** Annexure-A, Schedule of Technical deviations	

Rev No.	Date	Altered	Checked	Approved	REVISION DETAILS			
				Distribution	TBEM	TBMM	TBQM	Vendor
				Copies	1	1	1	1

SECTION 1

SCOPE, SPECIFIC TECHNICAL REQUIREMENTS AND QUANTITIES

1.0 SCOPE

This technical specification covers the requirements of design, manufacture, inspection and testing at manufacturer's works, proper packing and delivery to project sites and supervision of erection, testing & commissioning of 420kV, 245kV, 145kV & 72.5kV Circuit Breaker complete in all respect for efficient & trouble-free operation mentioned under this specification.

The specification comprises of following sections:

Section-1: Scope, Specific Technical Requirements & Bill of Quantities
Section-2: Equipment Specification
Section-3: Project Details & General Technical Requirements
Section-4: Guaranteed Technical Particulars
Section-5: Checklist

In case of any conflict between various sections, **order of precedence** shall be in the same order as listed above.

Note: The terms used in this specification namely, "Employer/Purchaser" refers to POWERGRID & "Contractor/Sub-contractor/manufacturer" refers to successful bidder. "GTR" refers to "section-3"

2.0 THE EQUIPMENT IS REQUIRED FOR THE FOLLOWING PROJECT

Name of Customer: POWERGRID Corporation of India Ltd (PGCIL)

Name of the Project:
1. 765/400/220kV Barmer-I (New), 765kV Sirohi (Extn.) and 400kV Fatehgarh-III (Extn.)
2. 765/400/220/132kV Kurawar (New), 400kV Shujalpur (Extn.), 400kV Ashtha (Extn.) 765kV Mandsaur (Extn.)
3. 765/400/220kV Mandsaur (New), 765kV Indore (Extn.)

Refer Section - 3 for Project Details and General Specifications

3.0 SPECIFIC TECHNICAL REQUIREMENTS

a. Technical Parameters of 400/220/132kV Circuit Breaker:

Sl. no.	Parameter		400kV system	220kV system	132 kV system	66 kV system
1.	Rated voltage (Umax) kV (rms)	kV (rms)	420	245	145	72.5
2.	Rated frequency (Hz)	Hz	50	50	50	50
3.	No. of poles	Nos.	3	3	3/1	3
4.	Type of circuit breaker		SF6 gas insulated	SF6 gas insulated	SF6 gas insulated	SF6 gas insulated

5.	Rated continuous current (A) at an ambient temperature of 50^0C	A	3150	1600/3150 (as applicable)	1250	1250
6.	Rated short circuit capacity with percentage of DC component as per IEC62271-100 corresponding to minimum opening time under operating conditions specified.	kA	63	50	40/31.5 (as applicable)	25
7.	Symmetrical interrupting capability kA (rms)	kA (rms)	63	50	31.5	25
8.	Rated short circuit making current kAp	kAp	157.5	125	80	63
9.	Short time current carrying capability kA (rms)	kA (rms)	63	50	31.5 for one second	25 for three second
10.	Out of phase breaking current carrying capability kA (rms)	kA (rms)	15.75	**As per IEC**	**As per IEC**	**As per IEC**
11.	Rated line charging interrupting current at 90 deg. Leading power factor angle (A rms) (The breaker shall be able to interrupt the rated line charging current with test voltage immediately before	A rms	600	As per IEC	As per IEC	As per IEC
12.	First pole to clear factor		1.3	1.3	1.3	1.5
13.	Temperature rise over an ambient temperature of 500C		As per IEC: 62271-100	As per IEC: 62271-100	As per IEC: 62271-100	As per IEC: 62271-100
14.	Rated break time as IEC (ms)	ms	40	60	60	Less than 75
15.	Total break time (ms)	ms	45	65	65	Less than 80
16.	Total closing time (ms)	ms	Not more than 150	Not more than **150**	Not more than **150**	Not more than **150**
17.	Operating mechanism or a combination of these		Spring	Spring	Spring	Spring
18.	Rated operating duty cycle		O-0.3s-CO-3 min-CO	O-0.3s-CO3 min-CO	O-0.3s-CO-3 min-CO	O-0.3s-CO-3 min-CO
19.	Reclosing		Single phase & Three phase auto reclosing.	Single phase & Three phase auto reclosing.	Three phase auto reclosing. (Single phase auto reclosing if specified in section project)	Three phase auto reclosing.

20.	Pre-insertion resistor requirement		As per BOQ	As per BOQ	As per BOQ	As per BOQ
i)	Rating (ohms)	ohms	400(max.) with tolerance as applicable	NA	NA	NA
ii)	Minimum electrical (mechanical insertion time +pre-arcing time) preinsertion time (ms)	ms	8	NA	NA	NA
iii)	Opening of PIR contacts		PIR contacts should open immediately after closing of main contacts OR At least 5 ms prior to opening of main contacts at rated air/gas pressure where the PIR contacts remain closed	NA	NA	NA
21.	Max. difference in the instants of closing/opening of contacts (ms) between poles at rated control voltage and rated operating & quenching media pressures	ms	2.5(within a pole) 2.3(opening) 5.0(closing)	3.3(opening) 5.0(closing)	3.3(opening) 3.3(closing)	As per IEC
22.	Maximum allowable switching over voltage under any switching condition	p.u.	2.3 p.u.	As per IEC	As per IEC	As per IEC
23.	Trip coil and closing coil voltage with variation as specified	V DC	220V DC	220V DC	220V DC or 110V DC	220V DC or 110V DC
24.	Noise level at base and up to 50 m distance from base of circuit breaker	dB	140dB (max.)	140dB (max.)	140dB (max.)	140dB (max.)
25.	Rating of Auxiliary contacts	A	10A at 220V DC	10A at 220V DC	10A at 220V DC	10A at 220V DC
26.	Breaking capacity of Aux. Contacts	A	2A DC with circuit time constant not less than 20ms	2A DC with circuit time constant not less than 20ms	2A DC with circuit time constant not less than 20ms	2A DC with circuit time constant not less than 20ms
27.	**Rated insulation levels**					
i)	Full wave impulse withstand (1.2 /50 μs) between line terminals and ground	kVp	±1425 kVp	±1050 kVp	±650 kVp	±325 kVp
ii)	Full wave impulse withstand (1.2 /50 μs) between terminals with circuit breaker open	kVp	1425 kVp impulse on one terminal & 240 kVp power	±1050 kVp	+ 650kVp	±325 kVp

			frequency voltage of opposite polarity on the other terminal			
iii)	Rated switching impulse withstand voltage (250/2500 µs) Dry & wet between line terminals and ground	kVp	+1050 kVp	NA	NA	NA
iv)	Rated switching impulse withstand voltage (250/2500 µs) Dry &wet Between terminals with circuit breaker open	kVp	900 kVp impulse on one terminal & 345 kVp power frequency voltage of opposite polarity on the other terminal	NA	NA	NA
v)	One minute power frequency dry withstand voltage between line terminals and ground		520 kV rms.	460 kV rms.	275 kV rms	140 kV rms
vi)	One minute power frequency dry withstand voltage between terminals with circuit breaker open		610 kV rms.	460 kV rms.	275 kV rms	160 kV rms
28.	Minimum corona extinction voltage with CB in all positions		320kV rms	156 kV rms	92 kV rms	NA
29.	Max. radio interference voltage for frequency between 0.5 MHz and 2 MHz (Micro volts)		1000 µV (at 266kV rms)	1000 µV (at 156kV rms)	500µV (at 92kV rms)	NA
30.	Minimum Creepage distance*					
i)	Phase to ground (25mm/kV) #	mm	10500mm	6125mm	3625mm	1813mm
ii)	Between CB terminals	mm	10500mm	6125mm	3625mm	1813mm
31.	System neutral earthing	Effectively earthed				
32.	Rated terminal load	As per IEC or as per the value calculated based on specific switchyard layout requirement, whichever is higher.				
33.	Auxiliary contacts	Besides requirement of technical specification, the manufacturer/bidder shall wire up 10 NO + 10 NC contacts exclusively for BHEL/POWERGRID use and wired up to common marshalling box.				
34.	No. of terminals in common marshalling box	All contacts & control circuits to be wired out up to common marshalling box + minimum 24 terminals exclusively for BHEL/POWERGRID future use				
35.	Seismic level	0.5g horizontal for the site location under the Zone-V as per IS-1893 0.3g horizontal for the site location under other than the Zone-V as per IS1893				

b. <u>400/220/132kV Circuit Breaker Parameters:</u>

For other parameters, refer respective section 2 for the applicable voltage class of Circuit Breakers.

The minimum weight of the zinc coating shall be 610 gm/sq.m and minimum average thickness of coating shall be 86 microns for all items having thickness 6mm and above and **900 gm/sq.m for coastal area** (for respective site). For items lower than 6mm thickness requirement of coating thickness shall be as per relevant ASTM. For surface which shall be embedded in concrete, the zinc coating shall be 610 gm/sq.m minimum and **900 gm/sq.m for coastal area** (for respective site).

4.0 TECHNICAL PRE-QUALIFYING REQUIREMENTS:

Refer Annexure-TQR

5.0 <u>SUPERVISION OF ERECTION COMMISSIONING AND TESTING:</u>

Supervision of Erection, testing and commissioning of all the supplied Circuit Breakers are in the bidder's scope. Bidder shall quote price for supervision of installation, testing and commissioning of all offered breakers. Bidder's testing engineer shall bring SF6 gas leak detector, SF6 gas filling adopter, timing kit and Transducer for operational analyzer (as per requirement).

Required unskilled man power / Labor, tools (other than special tools and tackles which shall be in bidder's scope) shall be provided by BHEL.

The measurement at site shall be carried out as per Powergrid Standard Pre-commissioning procedures as indicated in Section-2 Technical Specification. The commissioning report shall be prepared and signed by the manufacturer's representative.

Following Instruments shall be made available by BHEL to testing engineer
a) DCRM (Operational analyser) Kit
b) 5kV Insulation tester
c) 1kV Insulation tester
d) Single phase variac
e) Dew Point meter
f) Capacitance and Tan Delta Kit
g) Contact Resistance measurement kit
h) Multimeter

Any other instrument(s), if required for Testing/commissioning of Circuit Breaker shall be arranged by bidder. Cost of the same shall be deemed inclusive in the offer.
The respective dates of commencement of erection, testing and commissioning activities by BHEL will be intimated to the equipment manufacturer from time to time, so that arrangements for supervising the activity can be made accordingly by the manufacturer. Bidder to note that erection, testing and commissioning of all of the supplied breakers shall not be done in one go. Multiple visits shall be required.

6.0 BILL OF QUANTITES:

Refer Annexure-1 BOQ- BARMER-I (New), SIROHI (Extn.) & FATEHGARH-III (Extn.)
Refer Annexure-2 BOQ- KURAWAR (New), SHUJALPUR (Extn.), ASHTHA(Extn.) & MANDSAUR (Extn.)
Refer Annexure-3 BOQ- MANDSAUR (NEW)

7.0 TYPE TEST:

a. All equipment being supplied shall conform to type tests as per technical specification and shall be subject to routine tests in accordance with requirements stipulated under respective sections.

b. The reports for all type tests as per technical specification shall be furnished by the bidder along with equipment / material drawings. However, type test reports of similar equipments/ material already accepted in POWERGRID shall be applicable for all project with similar requirement. The type tests conducted earlier 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 POWERGRID or representative authorized by POWERGRID or Utility or representative of accredited test lab or reputed consultant or representative of The National Accreditation Board for Certification Bodies (NABCB) certified agency shall also be acceptable.

Unless otherwise specified elsewhere, the type test reports submitted shall be of the tests conducted within the 10 years from date of 01.01.2025. In case the test reports are of the test conducted earlier than the years specified from the date 01.01.2025, the bidder shall repeat these test(s) at no extra cost to the Employer

Further, in the event of any discrepancy in the test reports i.e. any test report not acceptable due to any design/manufacturing changes (including substitution of components) or due to non-compliance with the requirement stipulated in the Technical Specification or any/all type tests not carried out, same shall be carried out without any additional cost and delivery implication to the Purchaser/Employer.

The bidder shall intimate the BHEL/POWERGRID the detailed program about the tests at least two (2) weeks in advance in case of domestic supplies & six (6) weeks in advance in case of foreign supplies.

The Employer reserves the right to witness any or all the type tests. The Employer shall bear all expenses for deputation of Employer's representative(s) for witnessing the type tests except in the case of re-deputation if any, necessitated due to no fault of the Employer.

8.0 SPECIAL TOOLS AND TACKLES:

Bidder shall supply all special tools and tackle (other than maintenance tools as if mentioned in BOQ) which are specifically required for Circuit Breakers and are proprietary in nature. Cost of the same shall be deemed inclusive in the offer for main item. List of such special tools and tackle should be clearly listed along with the technical offer. Any special tool which is not listed in the technical spec / bid but required during the erection/commissioning of Circuit Breakers shall also be supplied by the bidder without time / cost implication.
In case, special tools and tackles which is proprietary in nature is not required for Erection/testing/commissioning or for smooth operation of Circuit Breaker, bidder has to submit a certificate mentioning that no special tools and tackles is required for Circuit Breakers.

9.0 PACKING:

9.1 All equipments shall be suitably protected, coated, covered or boxed and crated to prevent damage or deterioration during transit, handling and outdoor storage (for a minimum period of 6 months) at site till the time of erection. While packing all the materials, the limitations

from the point of view of availability of transportation facilities in India should be considered. The Bidder shall be responsible for any loss or damage during transportation, handling and storage.

9.2 The Bidder shall include and provide for security, protection and packing the equipment so as to avoid loss or damage during transport by any mode.

9.3 All packing shall allow for easy removal and checking at site. Wherever necessary, proper arrangement for attaching slings for lifting shall be provided. All packages shall be clearly marked for with signs showing 'UP' and 'DOWN' side of boxes, and handling and unpacking instructions as considered necessary. Special precautions shall be taken to prevent rusting of steel and iron parts during transit and storage. Gas seals or other methods proposed to be adopted for protection against moisture during transit shall be to the satisfaction of the purchaser.

9.4 The cases containing easily damageable material shall be very carefully packed and marked with appropriate caution symbols i.e. FRAGILE, HANDLE WITH CARE, USE NO HOOKS etc.

9.5 Each package delivered under the contract shall be marked by the Bidder at his expense and such marking must be distinct (all previous irrelevant marking being carefully obliterated). Such marking shall show the description and quantity of contents, the name of consignee and address, the gross and net weights of the package, the name of Bidder with a distinctive number of mark sufficient for purpose of identification. All markings shall be carried out with such materials as to ensure quickness of drying, fastness and legibility.

9.6 Each Package shall contain a note quoting specifically the name of the Bidder, the number and date of contract or order and the name of office placing the contract, nomenclature of the stores and include a schedule of parts for each complete equipment giving the parts number with reference to the General Arrangement/ Assembly drawing and the quantity of each part, drawing number and tag numbers.

9.7 All equipment/ material shall be suitably packed for transport, carriage at site and outdoor storage during transit. The Bidder shall be responsible for any damage to the equipment during transit. The contents of each package shall bear marking that can be readily identified from the package list and packing shall provide complete protection from moisture, termites and mechanical shocks etc.

9.8 Any material found short inside the packing cases shall be supplied by the Bidder without any extra cost.

9.9 Notwithstanding anything stated in this clause the Bidder shall be entirely responsible for any loss, damage or depreciation to the stores.

10.0 DEVIATIONS:

The bidder shall list all the deviation from the specification separately. Offers without specific deviation will be deemed to be totally in compliance with the specification and NO DEVIATION on any account will be entertained at a later date.

11.0 MANUFACTURING QUALITY PLAN:

Bidder should have POWERGRID approved and valid quality plan at contract stage. In case

bidder don't have POWERGRID approved Quality plan, it will be bidder's responsibility to get its quality plan approved directly POWERGRID

12.0 DRAWINGS and SCHEME:

The documentation requirements detailed under Section-2 and 3 shall be submitted to BHEL at various stages of contract. Softcopy of the drawings and schemes are to be submitted at contract stage. Preparation of AS- BUILT drawings is also in the scope of the bidder.

Date of Submission of first lot of drawings will be counted only from the date of reasonably correct drawings. List of drawings required for technical clearance of manufacturing are as follows:

1. Approved GTP
2. Approved GA.
3. Approved Type Test Reports

ANNEXURE-1

BOQ for BARMER-I (NEW), SIROHI (EXTN.) AND FATEHGARH-III (EXTN.) S/s

SN	Item Description	UOM	Qty			Remarks
			Barmer	Sirohi	Fatehgarh-III	
1	SUPPLY- CIRCUIT BREAKER: 420KV, 63KA FOR 1S, 25MM/KV CREEPAGE, 3150A 3PHASE CIRCUIT BREAKER WITHOUT PIR ALONGWITH SUPPORT STRUCTURE, INTERPOLE CABLES, OPERATING MECHANISM, CONTROL BOXESAND ALL ACCESSORIES COMPLETE IN ALL RESPECT	Nos.	14	-	-	
2	SUPPLY- CIRCUIT BREAKER: 245KV, 50KA FOR 1S, 25MM/KV CREEPAGE, 3150A 3PHASE CIRCUIT BREAKER WITHOUT PIR ALONGWITH SUPPORT STRUCTURE, INTERPOLE CABLES, OPERATING MECHANISM, CONTROL BOXESAND ALL ACCESSORIES COMPLETE IN ALL RESPECT	Nos.	1	-	-	
3	SUPPLY- CIRCUIT BREAKER: 245KV, 50KA FOR 1S, 25MM/KV CREEPAGE, 1600A 3PHASE CIRCUIT BREAKER WITHOUT PIR ALONGWITH SUPPORT STRUCTURE, INTERPOLE CABLES, OPERATING MECHANISM, CONTROL BOXESAND ALL ACCESSORIES COMPLETE IN ALL RESPECT	Nos.	7	-	-	
4	SUPPLY- CIRCUIT BREAKER: 145KV, 31.5KA FOR 1S, 25MM/KV CREEPAGE, 1250A, 1 PHASE CIRCUIT BREAKER FOR NGR BY PASSING, ALONGWITH SUPPORT STRUCTURE, INTERPOLE CABLES, OPERATING MECHANISM, CONTROL BOXES AND ALL ACCESSORIES COMPLETE IN ALL RESPECT	Nos.	2	2	-	
5	SUPPLY- CIRCUIT BREAKER: 72.5KV, 25KA FOR 1S, 25MM/KV CREEPAGE, 1250A 3PHASE CIRCUIT BREAKER WITHOUT PIR ALONGWITH SUPPORT STRUCTURE, INTERPOLE CABLES, OPERATING MECHANISM, CONTROL BOXESAND ALL ACCESSORIES COMPLETE IN ALL RESPECT	Nos.	1	-	-	
6	SUPPLY- CIRCUIT BREAKER: 420KV, CONTROLLED SWITCHING DEVICE FOR 3-PH CIRCUIT BREAKER	Nos.	11	-	-	
7	SUPPLY- CIRCUIT BREAKER: SPECIAL CABLES FOR CB / CSD / RP INTERFACING. MODE OF MEASUREMENT SHALL BE CABLE-TRENCH RUNNING LENGTH FROM CIRCUIT BREAKER TO CSD/ RELAY PANEL	MTR	2200	-	-	
8	SUPPLY- CIRCUIT BREAKER: 420KV, FOUNDATION BOLTS FOR CIRCUIT BREAKER, PLATFORM AND LADDER (IF APPLICABLE)	Set	42	-	9	1 Set equivalent 1 phase of CB.
9	SUPPLY- CIRCUIT BREAKER: 245KV, FOUNDATION BOLTS FOR CIRCUIT BREAKER, PLATFORM AND LADDER (IF APPLICABLE)	Set	24	-	-	1 Set equivalent 1 phase of CB.
10	SUPPLY- CIRCUIT BREAKER: 145KV, FOUNDATION BOLTS FOR CIRCUIT BREAKER, PLATFORM AND LADDER (IF APPLICABLE)	Set	2	2	-	1 Set equivalent 1 phase of CB.
11	SUPPLY- CIRCUIT BREAKER: 72.5KV, FOUNDATION BOLTS FOR CIRCUIT BREAKER, PLATFORM AND LADDER	Set	3	-	-	1 Set equivalent 1 phase of CB.
12	SUPPLY- CIRCUIT BREAKER: SF6 GAS FILLING ADOPTER, INCLUDING COUPLING, REGULATOR, CONNECTING HOSE PIPE UP TO GROUND LEVEL	Lot	1	1	1	
13	SUPPLY- CIRCUIT BREAKER: TRANSDUCERS / FIXTURES REQUIRED FOR TRAVEL MEASUREMENT OF COMPLETE 3-PHASE CB	Lot	1	1	1	

SN	Item Description	UOM	Qty			Remarks
			Barmer	Sirohi	Fatehgarh-III	
14	SPARES - CIRCUIT BREAKER: 400KV, COMPLETE POLE (1-PHASE) OF CIRCUIT BREAKER INCLUDING POLE COLUMN, INTERRUPTER, OPERATING MECHANISM, MARSHALLING BOX, CORONA RING (IF APPLICABLE) BUT WITHOUT CLOSING RESISTOR AND SUPPORT STRUCTURE (420KV, 3150A, 63KA FOR 1 SEC)	Nos.	1	-	-	
15	SPARES - CIRCUIT BREAKER: 400KV, RUBBER GASKET "O RING" AND SEALS (COMPLETE REPLACEMENT FOR 1-PH OF 420KV SF6 CIRCUIT BREAKER)	Set	1	-	-	
16	SPARES - CIRCUIT BREAKER: 400KV, TRIP COILS WITH RESISTOR (AS APPLICABLE)	Set	2	-	-	Of each type and rating
17	SPARES - CIRCUIT BREAKER: 400KV, CLOSING COILS WITH RESISTOR (AS APPLICABLE)	Set	1	-	-	Of each type and rating
18	SPARES - CIRCUIT BREAKER: 400KV, TERMINAL PAD AND CONNECTOR (ONE NO OF EACH TYPE)	Set	2	-	-	
19	SPARES - CIRCUIT BREAKER: 400KV, MOLECULAR FILTER	Nos.	2	-	-	
20	SPARES - CIRCUIT BREAKER: 400KV, CORONA RINGS (IF APPLICABLE)	Nos.	1	-	-	
21	SPARES - CIRCUIT BREAKER: 400KV, RELAY, POWER CONTACTORS, SWITCH FUSE UNITS, LIMIT SWITCHES FUSE UNITS, LIMIT SWITCHES, PUSH BUTTONS, TIMERS & MCB ETC (1 NO OF EACH TYPE)	Set	1	-	-	
22	SPARES - CIRCUIT BREAKER: 400KV, PRESSURE SWITCH OF EACH TYPE	Set	1	-	-	
23	SPARES - CIRCUIT BREAKER: 400KV, AUXILIARY SWITCH ASSEMBLY	Set	1	-	-	Of each type and rating
24	SPARES - CIRCUIT BREAKER: 400KV, OPERATION COUNTER	Nos.	1	-	-	
25	SPARES - CIRCUIT BREAKER: 400KV, COMPLETE DRIVE MECHANISM	Set	1	-	-	Of each type and rating
26	SPARES - CIRCUIT BREAKER: 400KV, SF6 GAS (EQUIVALENT TO 2 POLES)	Lot	1	-	-	
27	SPARES - CIRCUIT BREAKER: 220KV, COMPLETE POLE (1-PHASE) OF CIRCUIT BREAKER, POLE COLUMN, INTERRUPTER, OPERATING MECHANISM, MARSHALLING BOX, CORONA RING (IF APPLICABLE) BUT WITHOUT SUPPORT STRUCTURE (245KV, 1600A, 50KA FOR 1 SEC)	Nos.	1	-	-	
28	SPARES - CIRCUIT BREAKER: 220KV, RUBBER GASKET "O RING" AND SEALS (COMPLETE REPLACEMENT FOR 1-PH OF 245KV SF6 CIRCUIT BREAKER)	Set	2	-	-	
29	SPARES - CIRCUIT BREAKER: 220KV, TRIP COILS WITH RESISTOR (AS APPLICABLE)	Set	2	-	-	Of each type and rating
30	SPARES - CIRCUIT BREAKER: 220KV, CLOSING COILS WITH RESISTOR (AS APPLICABLE)	Set	2	-	-	Of each type and rating
31	SPARES - CIRCUIT BREAKER: 220KV, TERMINAL PAD AND CONNECTOR (ONE NO OF EACH TYPE)	Set	2	-	-	
32	SPARES - CIRCUIT BREAKER: 220KV, MOLECULAR FILTER	Nos.	2	-	-	
33	SPARES - CIRCUIT BREAKER: 220KV, CORONA RINGS (IF APPLICABLE)	Nos.	1	-	-	
34	SPARES - CIRCUIT BREAKER: 220KV, RELAY, POWER CONTACTORS, SWITCH FUSE UNITS, LIMIT SWITCHES FUSE UNITS, LIMIT SWITCHES, PUSH BUTTONS, TIMERS & MCB ETC (1 NO OF EACH TYPE)	Set	1	-	-	

SN	Item Description	UOM	Qty			Remarks
			Barmer	Sirohi	Fatehgarh-III	
35	SPARES - CIRCUIT BREAKER: 220KV, PRESSURE SWITCH OF EACH TYPE	Set	1	-	-	
36	SPARES - CIRCUIT BREAKER: 220KV, AUXILIARY SWITCH ASSEMBLY	Set	1	-	-	Of each type and rating
37	SPARES - CIRCUIT BREAKER: 220KV, OPERATION COUNTER	Nos.	1	-	-	
38	SPARES - CIRCUIT BREAKER: 220KV, COMPLETE DRIVE MECHANISM	Set	1	-	-	Of each type and rating
39	SPARES - CIRCUIT BREAKER: 220KV, SF6 GAS (EQUIVALENT TO 2 POLES)	Lot	1	-	-	
40	SERVICES - CIRCUIT BREAKER: 400KV, SUPERVISION OF ERECTION, TESTING AND COMMISSIONING OF CIRCUIT BREAKER	Nos.	14	-	3	For 3- Phase CB
41	SERVICES - CIRCUIT BREAKER: 220KV, SUPERVISION OF ERECTION, TESTING AND COMMISSIONING OF CIRCUIT BREAKER	Nos.	8	-	-	For 3- Phase CB
42	SERVICES - CIRCUIT BREAKER: 145KV, SUPERVISION OF ERECTION, TESTING AND COMMISSIONING OF 1-PHASE CIRCUIT BREAKER	Nos.	2	2	-	For 1- Phase CB
43	SERVICES - CIRCUIT BREAKER: 72.5KV, SUPERVISION OF ERECTION, TESTING AND COMMISSIONING OF CIRCUIT BREAKER	Nos.	1	-	-	For 3- Phase CB
44	SERVICES - CIRCUIT BREAKER: 400KV, SUPERVISION OF ERECTION, TESTING AND COMMISSIONING OF CONTROLLED SWITCHING DEVICE FOR 3 PHASE CIRCUIT BREAKER	Nos.	11	-	-	

ANNEXURE-2

BOQ for KURAWAR(NEW), SHUJALPUR(EXTN.), ASHTHA(EXTN.) AND MANDSAUR(EXTN.) S/s

SN	Item Description	UOM	Qty				Remarks
			Kurawar	Shujalpur	Ashtha	Mandsaur	
1	SUPPLY- CIRCUIT BREAKER: 420KV, 63KA FOR 1S, 25MM/KV CREEPAGE, 3150A 3PHASE CIRCUIT BREAKER WITHOUT PIR ALONGWITH SUPPORT STRUCTURE, INTERPOLE CABLES, OPERATING MECHANISM, CONTROL BOXESAND ALL ACCESSORIES COMPLETE IN ALL RESPECT	Nos.	14	3	4	-	
2	SUPPLY- CIRCUIT BREAKER: 245KV, 50KA FOR 1S, 25MM/KV CREEPAGE, 3150A 3PHASE CIRCUIT BREAKER WITHOUT PIR ALONGWITH SUPPORT STRUCTURE, INTERPOLE CABLES, OPERATING MECHANISM, CONTROL BOXESAND ALL ACCESSORIES COMPLETE IN ALL RESPECT	Nos.	1	-	-	-	
3	SUPPLY- CIRCUIT BREAKER: 245KV, 50KA FOR 1S, 25MM/KV CREEPAGE, 1600A 3PHASE CIRCUIT BREAKER WITHOUT PIR ALONGWITH SUPPORT STRUCTURE, INTERPOLE CABLES, OPERATING MECHANISM, CONTROL BOXESAND ALL ACCESSORIES COMPLETE IN ALL RESPECT	Nos.	6	-	-	-	
4	SUPPLY- CIRCUIT BREAKER: 145KV, 40KA FOR 1S, 25MM/KV CREEPAGE, 1250A, 3 PHASE CIRCUIT BREAKER WITHOUT PIR ALONGWITH SUPPORT STRUCTURE, INTERPOLE CABLES, OPERATING MECHANISM, CONTROL BOXESAND ALL ACCESSORIES COMPLETE IN ALL RESPECT	Nos.	4	-	-	-	
5	SUPPLY- CIRCUIT BREAKER: 145KV, 31.5KA FOR 1S, 25MM/KV CREEPAGE, 1250A, 1 PHASE CIRCUIT BREAKER FOR NGR BY PASSING, ALONGWITH SUPPORT STRUCTURE, INTERPOLE CABLES, OPERATING MECHANISM, CONTROL BOXES AND ALL ACCESSORIES COMPLETE IN ALL RESPECT	Nos.	2	-	-	2	
6	SUPPLY- CIRCUIT BREAKER: 72.5KV, 25KA FOR 1S, 25MM/KV CREEPAGE, 1250A 3PHASE CIRCUIT BREAKER WITHOUT PIR ALONGWITH SUPPORT STRUCTURE, INTERPOLE CABLES, OPERATING MECHANISM, CONTROL BOXESAND ALL ACCESSORIES COMPLETE IN ALL RESPECT	Nos.	1	-	-	-	
7	SUPPLY- CIRCUIT BREAKER: 420KV, CONTROLLED SWITCHING DEVICE FOR 3-PH CIRCUIT BREAKER	Nos.	8	-	-	-	
8	SUPPLY- CIRCUIT BREAKER: SPECIAL CABLES FOR CB / CSD / RP INTERFACING. MODE OF MEASUREMENT SHALL BE CABLE-TRENCH RUNNING LENGTH FROM CIRCUIT BREAKER TO CSD/ RELAY PANEL	MTR	1600	-	-	-	

SN	Item Description	UOM	Qty				Remarks
			Kurawar	Shujalpur	Ashtha	Mandsaur	
9	SUPPLY- CIRCUIT BREAKER: 420KV, FOUNDATION BOLTS FOR CIRCUIT BREAKER, PLATFORM AND LADDER (IF APPLICABLE)	Set	42	9	12	-	1 Set equivalent 1 phase of CB.
10	SUPPLY- CIRCUIT BREAKER: 245KV, FOUNDATION BOLTS FOR CIRCUIT BREAKER, PLATFORM AND LADDER (IF APPLICABLE)	Set	21	-	-	-	1 Set equivalent 1 phase of CB.
11	SUPPLY- CIRCUIT BREAKER: 145KV, FOUNDATION BOLTS FOR CIRCUIT BREAKER, PLATFORM AND LADDER (IF APPLICABLE)	Set	14	-	-	2	1 Set equivalent 1 phase of CB.
12	SUPPLY- CIRCUIT BREAKER: 72.5KV, FOUNDATION BOLTS FOR CIRCUIT BREAKER, PLATFORM AND LADDER	Set	3	-	-	-	1 Set equivalent 1 phase of CB.
13	SUPPLY- CIRCUIT BREAKER: SF6 GAS FILLING ADOPTER, INCLUDING COUPLING, REGULATOR, CONNECTING HOSE PIPE UP TO GROUND LEVEL	Lot	1	1	1	1	
14	SUPPLY- CIRCUIT BREAKER: TRANSDUCERS / FIXTURES REQUIRED FOR TRAVEL MEASUREMENT OF COMPLETE 3-PHASE CB	Lot	1	1	1	1	
15	SPARES - CIRCUIT BREAKER: 400KV, COMPLETE POLE (1-PHASE) OF CIRCUIT BREAKER INCLUDING POLE COLUMN, INTERRUPTER, OPERATING MECHANISM, MARSHALLING BOX, CORONA RING (IF APPLICABLE) BUT WITHOUT CLOSING RESISTOR AND SUPPORT STRUCTURE (420KV, 3150A, 63KA FOR 1 SEC)	Nos.	1	-	-	-	
16	SPARES - CIRCUIT BREAKER: 400KV, GRADING CAPACITOR (IF APPLICABLE)	Nos.	2	-	-	-	
17	SPARES - CIRCUIT BREAKER: 400KV, RUBBER GASKET “O RING” AND SEALS (COMPLETE REPLACEMENT FOR 1-PH OF 420KV SF6 CIRCUIT BREAKER)	Set	1	-	-	-	
18	SPARES - CIRCUIT BREAKER: 400KV, TRIP COILS WITH RESISTOR (AS APPLICABLE)	Set	2	-	-	-	Of each type and rating
19	SPARES - CIRCUIT BREAKER: 400KV, CLOSING COILS WITH RESISTOR (AS APPLICABLE)	Set	1	-	-	-	Of each type and rating
20	SPARES - CIRCUIT BREAKER: 400KV, TERMINAL PAD AND CONNECTOR (ONE NO OF EACH TYPE)	Set	2	-	-	-	
21	SPARES - CIRCUIT BREAKER: 400KV, MOLECULAR FILTER	Nos.	2	-	-	-	
22	SPARES - CIRCUIT BREAKER: 400KV, CORONA RINGS (IF APPLICABLE)	Nos.	1	-	-	-	
23	SPARES - CIRCUIT BREAKER: 400KV, RELAY, POWER CONTACTORS, SWITCH FUSE UNITS, LIMIT SWITCHES FUSE UNITS, LIMIT SWITCHES, PUSH BUTTONS, TIMERS & MCB ETC (1 NO OF EACH TYPE)	Set	1	-	-	-	
24	SPARES - CIRCUIT BREAKER: 400KV, PRESSURE SWITCH OF EACH TYPE	Set	1	-	-	-	

SN	Item Description	UOM	Qty				Remarks
			Kurawar	Shujalpur	Ashtha	Mandsaur	
25	SPARES - CIRCUIT BREAKER: 400KV, AUXILIARY SWITCH ASSEMBLY	Set	1	-	-	-	Of each type and rating
26	SPARES - CIRCUIT BREAKER: 400KV, OPERATION COUNTER	Nos.	1	-	-	-	
27	SPARES - CIRCUIT BREAKER: 400KV, COMPLETE DRIVE MECHANISM	Set	1	-	-	-	Of each type and rating
28	SPARES - CIRCUIT BREAKER: 400KV, SF6 GAS (EQUIVALENT TO 2 POLES)	Lot	1	-	-	-	
29	SPARES - CIRCUIT BREAKER: 220KV, COMPLETE POLE (1-PHASE) OF CIRCUIT BREAKER, POLE COLUMN, INTERRUPTER, OPERATING MECHANISM, MARSHALLING BOX, CORONA RING (IF APPLICABLE) BUT WITHOUT SUPPORT STRUCTURE (245KV, 1600A, 50KA FOR 1 SEC)	Nos.	1	-	-	-	
30	SPARES - CIRCUIT BREAKER: 220KV, RUBBER GASKET “O RING” AND SEALS (COMPLETE REPLACEMENT FOR 1-PH OF 245KV SF6 CIRCUIT BREAKER)	Set	2	-	-	-	
31	SPARES - CIRCUIT BREAKER: 220KV, TRIP COILS WITH RESISTOR (AS APPLICABLE)	Set	2	-	-	-	Of each type and rating
32	SPARES - CIRCUIT BREAKER: 220KV, CLOSING COILS WITH RESISTOR (AS APPLICABLE)	Set	2	-	-	-	Of each type and rating
33	SPARES - CIRCUIT BREAKER: 220KV, TERMINAL PAD AND CONNECTOR (ONE NO OF EACH TYPE)	Set	2	-	-	-	
34	SPARES - CIRCUIT BREAKER: 220KV, MOLECULAR FILTER	Nos.	2	-	-	-	
35	SPARES - CIRCUIT BREAKER: 220KV, CORONA RINGS (IF APPLICABLE)	Nos.	1	-	-	-	
36	SPARES - CIRCUIT BREAKER: 220KV, RELAY, POWER CONTACTORS, SWITCH FUSE UNITS, LIMIT SWITCHES FUSE UNITS, LIMIT SWITCHES, PUSH BUTTONS, TIMERS & MCB ETC (1 NO OF EACH TYPE)	Set	1	-	-	-	
37	SPARES - CIRCUIT BREAKER: 220KV, PRESSURE SWITCH OF EACH TYPE	Set	1	-	-	-	
38	SPARES - CIRCUIT BREAKER: 220KV, AUXILIARY SWITCH ASSEMBLY	Set	1	-	-	-	Of each type and rating
39	SPARES - CIRCUIT BREAKER: 220KV, OPERATION COUNTER	Nos.	1	-	-	-	
40	SPARES - CIRCUIT BREAKER: 220KV, COMPLETE DRIVE MECHANISM	Set	1	-	-	-	Of each type and rating
41	SPARES - CIRCUIT BREAKER: 220KV, SF6 GAS (EQUIVALENT TO 2 POLES)	Lot	1	-	-	-	
42	SPARES - CIRCUIT BREAKER: 145KV, COMPLETE POLE (1-PHASE) OF CIRCUIT BREAKER, POLE COLUMN, INTERRUPTER, OPERATING MECHANISM, MARSHALLING BOX, CORONA RING (IF APPLICABLE) BUT WITHOUT SUPPORT STRUCTURE (245KV, 1600A, 50KA FOR 1 SEC)	Nos.	1	-	-	-	

SN	Item Description	UOM	Qty				Remarks
			Kurawar	Shujalpur	Ashtha	Mandsaur	
43	SPARES - CIRCUIT BREAKER: 145KV, RUBBER GASKET "O RING" AND SEALS (COMPLETE REPLACEMENT FOR 1-PH OF 145KV SF6 CIRCUIT BREAKER)	Set	2	-	-	-	
44	SPARES - CIRCUIT BREAKER: 145KV, TRIP COILS WITH RESISTOR (AS APPLICABLE)	Set	2	-	-	-	Of each type and rating
45	SPARES - CIRCUIT BREAKER: 145KV, CLOSING COILS WITH RESISTOR (AS APPLICABLE)	Set	2	-	-	-	Of each type and rating
46	SPARES - CIRCUIT BREAKER: 145KV, TERMINAL PAD AND CONNECTOR (ONE NO OF EACH TYPE)	Set	2	-	-	-	
47	SPARES - CIRCUIT BREAKER: 145KV, MOLECULAR FILTER	Nos.	2	-	-	-	
48	SPARES - CIRCUIT BREAKER: 145KV, CORONA RINGS (IF APPLICABLE)	Nos.	1	-	-	-	
49	SPARES - CIRCUIT BREAKER: 145KV, RELAY, POWER CONTACTORS, SWITCH FUSE UNITS, LIMIT SWITCHES FUSE UNITS, LIMIT SWITCHES, PUSH BUTTONS, TIMERS & MCB ETC (1 NO OF EACH TYPE)	Set	1	-	-	-	
50	SPARES - CIRCUIT BREAKER: 145KV, PRESSURE SWITCH OF EACH TYPE	Set	1	-	-	-	
51	SPARES - CIRCUIT BREAKER: 145KV, AUXILIARY SWITCH ASSEMBLY	Set	1	-	-	-	Of each type and rating
52	SPARES - CIRCUIT BREAKER: 145KV, OPERATION COUNTER	Nos.	1	-	-	-	
53	SPARES - CIRCUIT BREAKER: 145KV, COMPLETE DRIVE MECHANISM	Set	1	-	-	-	Of each type and rating
54	SPARES - CIRCUIT BREAKER: 145KV, SF6 GAS (EQUIVALENT TO 2 POLES)	Lot	1	-	-	-	
55	SERVICES - CIRCUIT BREAKER: 400KV, SUPERVISION OF ERECTION, TESTING AND COMMISSIONING OF CIRCUIT BREAKER	Nos.	14	3	4	-	For 3-Phase CB
56	SERVICES - CIRCUIT BREAKER: 220KV, SUPERVISION OF ERECTION, TESTING AND COMMISSIONING OF CIRCUIT BREAKER	Nos.	7	-	-	-	For 3-Phase CB
57	SERVICES - CIRCUIT BREAKER: 145KV, SUPERVISION OF ERECTION, TESTING AND COMMISSIONING OF CIRCUIT BREAKER	Nos.	4	-	-	-	For 3-Phase CB
58	SERVICES - CIRCUIT BREAKER: 145KV, SUPERVISION OF ERECTION, TESTING AND COMMISSIONING OF 1-PHASE CB	Nos.	2	-	-	2	For 1-Phase CB
59	SERVICES - CIRCUIT BREAKER: 72.5KV, SUPERVISION OF ERECTION, TESTING AND COMMISSIONING OF CB	Nos.	1	-	-	-	For 3-Phase CB
60	SERVICES - CIRCUIT BREAKER: 400KV, SUPERVISION OF ERECTION, TESTING AND COMMISSIONING OF CONTROLLED SWITCHING DEVICE FOR 3 PHASE CIRCUIT BREAKER	Nos.	8	-	-	-	

ANNEXURE-3

BOQ for MANDSAUR(NEW) S/s

SN	Item Description	UOM	Qty	Remarks
			Mandsaur	
1	SUPPLY- CIRCUIT BREAKER: 420KV, 63KA FOR 1S, 25MM/KV CREEPAGE, 3150A 3PHASE CIRCUIT BREAKER WITHOUT PIR ALONGWITH SUPPORT STRUCTURE, INTERPOLE CABLES, OPERATING MECHANISM, CONTROL BOXESAND ALL ACCESSORIES COMPLETE IN ALL RESPECT	Nos.	15	
2	SUPPLY- CIRCUIT BREAKER: 245KV, 50KA FOR 1S, 25MM/KV CREEPAGE, 3150A 3PHASE CIRCUIT BREAKER WITHOUT PIR ALONGWITH SUPPORT STRUCTURE, INTERPOLE CABLES, OPERATING MECHANISM, CONTROL BOXESAND ALL ACCESSORIES COMPLETE IN ALL RESPECT	Nos.	4	
3	SUPPLY- CIRCUIT BREAKER: 245KV, 50KA FOR 1S, 25MM/KV CREEPAGE, 1600A 3PHASE CIRCUIT BREAKER WITHOUT PIR ALONGWITH SUPPORT STRUCTURE, INTERPOLE CABLES, OPERATING MECHANISM, CONTROL BOXESAND ALL ACCESSORIES COMPLETE IN ALL RESPECT	Nos.	14	
4	SUPPLY- CIRCUIT BREAKER: 145KV, 31.5KA FOR 1S, 25MM/KV CREEPAGE, 1250A, 1 PHASE CIRCUIT BREAKER FOR NGR BY PASSING, ALONGWITH SUPPORT STRUCTURE, INTERPOLE CABLES, OPERATING MECHANISM, CONTROL BOXES AND ALL ACCESSORIES COMPLETE IN ALL RESPECT	Nos.	2	
5	SUPPLY- CIRCUIT BREAKER: 72.5KV, 25KA FOR 1S, 25MM/KV CREEPAGE, 1250A 3PHASE CIRCUIT BREAKER WITHOUT PIR ALONGWITH SUPPORT STRUCTURE, INTERPOLE CABLES, OPERATING MECHANISM, CONTROL BOXESAND ALL ACCESSORIES COMPLETE IN ALL RESPECT	Nos.	1	
6	SUPPLY- CIRCUIT BREAKER: 420KV, CONTROLLED SWITCHING DEVICE FOR 3-PH CIRCUIT BREAKER	Nos.	10	
7	SUPPLY- CIRCUIT BREAKER: SPECIAL CABLES FOR CB / CSD / RP INTERFACING. MODE OF MEASUREMENT SHALL BE CABLE-TRENCH RUNNING LENGTH FROM CIRCUIT BREAKER TO CSD/ RELAY PANEL	MTR	2000	
8	SUPPLY- CIRCUIT BREAKER: 420KV, FOUNDATION BOLTS FOR CIRCUIT BREAKER, PLATFORM AND LADDER (IF APPLICABLE)	Set	45	1 Set equivalent 1 phase of CB.
9	SUPPLY- CIRCUIT BREAKER: 245KV, FOUNDATION BOLTS FOR CIRCUIT BREAKER, PLATFORM AND LADDER(IF APPLICABLE)	Set	54	1 Set equivalent 1 phase of CB.
10	SUPPLY- CIRCUIT BREAKER: 145KV, FOUNDATION BOLTS FOR CIRCUIT BREAKER, PLATFORM AND LADDER (IF APPLICABLE)	Set	2	1 Set equivalent 1 phase of CB.
11	SUPPLY- CIRCUIT BREAKER: 72.5KV, FOUNDATION BOLTS FOR CIRCUIT BREAKER, PLATFORM AND LADDER(IF APPLICABLE)	Set	3	1 Set equivalent 1 phase of CB.
12	SUPPLY- CIRCUIT BREAKER: SF6 GAS FILLING ADOPTER, INCLUDING COUPLING, REGULATOR, CONNECTING HOSE PIPE UP TO GROUND LEVEL	Lot	1	
13	SUPPLY- CIRCUIT BREAKER: TRANSDUCERS / FIXTURES REQUIRED FOR TRAVEL MEASUREMENT OF COMPLETE 3-PHASE CB	Lot	1	
14	SERVICES - CIRCUIT BREAKER: 400KV, SUPERVISION OF ERECTION, TESTING AND COMMISSIONING OF CIRCUIT BREAKER	Nos.	15	For 3- Phase CB
15	SERVICES - CIRCUIT BREAKER: 220KV, SUPERVISION OF ERECTION, TESTING AND COMMISSIONING OF CIRCUIT BREAKER	Nos.	18	For 3- Phase CB
16	SERVICES- CIRCUIT BREAKER: 145KV, SUPERVISION OF ERECTION, TESTING AND COMMISSIONING OF 1–PHASE CIRCUIT BREAKER	Nos.	2	For 1- Phase CB

SN	Item Description	UOM	Qty	Remarks
			Mandsaur	
17	SERVICES- CIRCUIT BREAKER: 72.5KV, SUPERVISION OF ERECTION, TESTING AND COMMISSIONING OF CIRCUIT BREAKER	Nos.	1	For 3- Phase CB
18	SERVICES- CIRCUIT BREAKER: 400KV, SUPERVISION OF ERECTION TESTING AND COMMISSIONING OF CONTROLLED SWITCHING DEVICE	Nos.	10	

Notes for above BOQs –

1. The above quantities may vary ± 25%.
2. Prices for all applicable accessories & hardware of Circuit Breakers shall be included in the equipment prices.
3. Respective dates for the commencement of erection, testing and commissioning activities of Circuit Breakers shall be communicated to manufacturers from time to time as per the readiness of respective sites. Bidder to note that erection, testing and commissioning of all of the supplied breakers shall not be done one go. Multiple visits shall be required.
4. For Item of Foundation bolt, Platform and ladder in above BOQ, 1 Set is defined as total qty required for each phase of Circuit Breaker. In case of addition/deletion of any Circuit Breaker, this item shall be dealt on pro data basis.
5. For CSD Cable, Per meter price should consist of required no. of cable runs, i.e. price for per meter of multiple runs. Average distance between circuit breaker mechanism box to CSD located in relay panel is taken as 200 m per breaker. Total length of the cable should be decided by bidder considering above distance and required no. of runs. Cable shall be provided with single drum length after confirmation by BHEL during detailed engineering. Sensors, timers, relay gland and lugs etc. shall be in bidder scope. If special cable is not required, vendor to quote normal cable as required.
6. Testing & Commissioning instruments (Time interval meter (Timing kit), SF6 gas leakage detector & any other special tools like Gas filling adapter etc) shall be brought by supplier and shall be taken back after successful completion of testing and commissioning.

7. **Additional Requirements:**

i. All cables within & between circuit breaker poles and its marshalling box and up to the controlled switching device shall be in bidder's scope of supply. Cable shall be provided with single drum length considering all circuit breakers. Necessary glands and lugs to be provided. Bidder to provide detailed "Bill of Quantity" during detailed engineering stage.

ii. Cabling & termination schedule for the same shall be provided by successful bidder along with AS MANUFACTURED drawing during contract stage.

iii. TB's for incoming AC Power Cables shall be suitable for size (minimum) 4Cx16 sq. mm. Al.

iv. LED luminaries/light is to be provided as per technical requirement (minimum 7 watt).

v. Following minimum accessories are clarified as bidder's scope of supply

- **Structure** for Equipment support, Ladder & Platform etc.
- **Foundation bolts** for Circuit Breaker, CB ladder, CB Platform, common control cubicle.
- **Cable Tray** arrangement to be mounted on Breaker structure.
- Breaker **Terminal pad**.

vi. Following are not in bidder's scope of supply (BHEL supplied items)

- Terminal Connectors.

SECTION-2

Refer Technical Specification, Section: Switchgear-CB, REV.11 C/ENGG/SPEC/SWGR/CB, DEC-2016 **with additional requirement as mentioned in attached section-2**

SECTION-2

TECHNICAL SPECIFICATION
SECTION: SWITCHGEAR-CB
REVISION-11

SPECIFIC REQUIREMENT

C.	Section Switchgear – CB Rev 11	
1.	**Clause no. 2.6 Para 2**	The CSD shall be provided in following circuit breakers: d) 765kV • Main and Tie bay for Auto Transformer • Main and Tie bay of Bus Reactor • Switchable Line Reactor bay e) 400kV • Main and Tie bay for 765/400kV Auto Transformer • Main and Tie bay of Bus Reactor • Switchable Line Reactor bay f) 220 & 132kV • Bay for operation of Shunt reactor The requirement of CSD shall be explicitly specified in price schedule.
2.	**New Clause no. 2.6.1(n)**	For Circuit breaker with CSD controlling a Transformer following is applicable "The limit for inrush current for switching of Transformer by CSD shall be 1.0 p.u. of rated current of transformer after fine tuning of CSD settings during pre-commissioning checks. For site acceptance of CSD, during online CSD test after fine tuning inrush current should be less than 1.0 P.U. of rated current in five consecutive operations".
3.	**Clause No. 11.4**	Separate cables shall be used for AC, DC-I, DC-II and selected DC. **Each control cable shall include minimum 10% spare cores (subject to minimum 1 no. of spare core).**
4.	**Clause No. 11.5**	Requirement of Plug-In type connector for Inter-pole cabling is deleted
5.	**Clause No. 11.6**	Vertical run of cables to the operating mechanism box shall be properly supported by providing the perforated closed type galvanized cable tray (Cable tray also to be supplied along with the Circuit Breaker) to be fixed as an integral part of the structures. The load of the cable shall not be transferred to the mechanism box/terminal arrangement in any circumstances. Hanging or loose run of cable is not permitted. The drawing of cable tray including fixing arrangement shall be incorporated in the GA drawing of CB also.

6.	**Clause No. 16.0 S.No. 20 (i)**	**Parameter**	**765kV system**	**400kV system**	**220kV system**	**132 kV system**	**66kV System**	
		Pre-insertion resistor requirement	As per BPS	As per BPS	NA	NA	NA	
		Rating (ohms)	Approx. 450 with tolerance as applicable	Approx. 400 with tolerance as applicable	NA	NA	NA	

Summary of major changes made in this revision w.r.t earlier Technical Specification, Section: Switchgear, Chapter-CB, Rev.10A & Section: Switchgear, Chapter 765kV CB, Rev.02

1) Technical specification, Section: Switchgear, Chapter 765kV CB, Rev.02 and Section: Switchgear, Chapter CB, Rev.10A are merged to prepare this combined technical specification section up to 765kV CB.

2) All 765kV & 400kV Circuit Breaker control schematics shall be finalized in such a way, that it may operate with or without CSD (refer clause 1.6)

3) Some duty requirements parameters added/modified (refer clause 2.0)

4) SF6 gas for main CBs shall be supplied in returnable cylinders (refer clause 5.0)

5) Insulators for Circuit breakers can be of Porcelain/polymer type (refer clause 6.0)

6) Included Indicative platform & ladder drawing for 400kV&765kV CB (refer clause 9.0)

7) Included Plug-in type arrangement for termination of inter pole cables (refer clause 11.0)

8) Included Technical parameters for 72.5kV CB (refer clause 16.0)

9) Some parameters like dielectric, creepage, seismic requirement etc w.r.t CBs are included (refer clause 16.0)

10) Included Actions required for defects observed during defect liability period (refer clause 18.0)

Note:
Changes made in this document are shown with bold letters, further major changes are listed above; however for complete details of changes, please refer the complete technical specification, Section: Switchgear-CB, REV.11

SECTION: SWITCHGEAR–CB (CIRCUIT BREAKER)

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SECTION: SWITCHGEAR–CB (CIRCUIT BREAKER)

1.0 GENERAL

1.1 The circuit breakers and accessories shall conform to IEC: 62271-100, IEC: 62271-1 and other relevant IEC standards except to the extent explicitly modified in the specification and shall also be in accordance with requirements specified in Section-GTR.

1.2 800/420/245/145/**72.5**kV circuit breakers offered would be of sulphur hexafluoride (SF6) type and of class C2-M2 as per IEC. The bidder may offer circuit breakers of either live tank type or dead tank type of proven design.

1.3 The circuit breaker shall be complete with operating mechanism, **common marshalling box**, piping, inter-pole cables, cable accessories like glands, terminal blocks, marking ferrules, lugs, pressure gauges, density monitors (with graduated scale), galvanised support structure, **platform with ladder** for CB, their foundation bolts and all other accessories required for carrying out all the functions of the CB.

All necessary parts to provide a complete and operable circuit breaker installation such as terminal pads, control parts and other devices shall be provided.

1.4 Painting shall be done in line with Section – GTR. **Paint shade RAL-7032** or similar shades can be used for painting. The support structure, **platform & ladder** of circuit breaker shall be hot dip galvanised. Exposed hardware items shall be hot dip galvanised or Electro-galvanised.

1.5 The circuit breakers shall be designed for use in the geographic and meteorological conditions as given in Section-**Project**.

1.6 **All 765kV & 400kV Circuit Breaker control schematics shall be finalized in such a way, that it may operate with or without CSD by using a suitable selector switch irrespective of whether circuit breakers to be supplied are envisaged along with CSD or not as per bid price schedules.**

2.0 DUTY REQUIREMENTS

2.1 The circuit breakers shall be capable of performing their duties without opening resistors.

2.2 The circuit breaker shall meet the duty requirements for any type of fault or fault location **and** also for line switching when used on effectively grounded system and perform make and break operations as per the stipulated duty cycles satisfactorily.

2.2.1 PRE-INSERTION RESISTER

800kV & 420kV circuit breakers shall be provided with single step pre-insertion closing resistors **(wherever the requirement of PIR is explicitly specified in bid price schedules)** to limit the switching surges. The resistance value of pre-insertion resistor and the duration of pre-insertion time **is** given in clause **16.0** of this section. The resistor shall have thermal rating for the following duties:

i) TERMINAL FAULT

Close .... 1 Min .... Open Close Open…..2 min ..... Close ..... 1 Min ..... Open Close Open.

ii) RECLOSING AGAINST TRAPPED CHARGES

Duty shall be the same as under (i) above. The first, third and fourth closures are to be on de - energised line while second closing is to be made with lines against trapped charge of 1.2 p.u. of opposite polarity.

iii) OUT OF PHASE CLOSING

One closing operation under phase opposition, that is with twice the voltage across the terminals.

iv) No allowance shall be made for heat dissipation of resistor during time interval between successive closing operations. The resistors and resistor supports shall perform all these duties without deterioration. Test reports of resistors proving thermal rating for duties specified above shall be furnished during detailed engineering. The calculations shall be provided to take care of the effect of tolerances on resistance values and insertion time.

2.3 The breaker shall be capable of:

i) Interrupting the steady and transient magnetizing current corresponding to Power transformers as follows:

Voltage rating of CB	**Type of Transformer**	**Rating (in MVA)**
800kV	**765/400kV**	**250 to 1500**
420kV	**765/400kV**	**250 to 1500**
	400/220kV	**250 to 630**
	400/132kV	**160 to 315**
245kV	**400/220kV**	**200 to 630**
	220/132kV	**50 to 200**

	220/66kV	**50 to 200**
145kV	**220/132kV**	**50 to 200**
	132/33kV	**10 to 50**

ii) Interrupting line/cable charging current as per IEC without use of opening resistors. **The breaker shall be able to interrupt the rated line charging current as per IEC-62271-100 with test voltage immediately before opening equal to the product of U/√3 and 1.4**

iii) Clearing short line fault (kilometric faults) with source impedance behind the bus equivalent to symmetrical fault current specified.

iii) Breaking 25% of the rated fault current at twice rated voltage under phase opposition condition.

i**v) Withstanding all dielectric stresses imposed on it in open condition at lock out pressure continuously (i.e. shall be designed for 2 p.u. across the breaker continuously, for validation of which a power frequency withstand test conducted for a duration of at least 15 minutes is acceptable).**

v) Circuit breakers shall be able to switch in and out the shunt reactor as detailed below:

Voltage rating of CB	**Reactor Rating (in MVAR)**	**Max. rise of over voltage (in p.u.)**
800kV	**150 to 330**	**1.9**
420kV	**50 to 150**	**2.3**
245kV	**25 to 50**	**2.3**

a. Capability of 400 kV circuit breakers to interrupt inductive current below 100 A without giving rise to overvoltage more than 2.3 p.u. (As specified in IEC-62271-110) shall be validated by carrying out the simulation study/analysis (EMTP/PSCAD) by modeling an equivalent circuit comprising all circuit component i.e. Inductance of Shunt Reactor, Stray capacitance of Shunt Reactor, Circuit Breaker, Stray capacitance of Bus Connection, Capacitance of grading Capacitor, inductance of neutral grounding reactor, Network Thevenin's equivalent, any other series/parallel inductance/capacitance connected to simulate the actual inductive load switching.

b. Current chopping capability (chopping number) of circuit breaker as per IEC-62271-306 to be figured out from actual Laboratory test and / or field test report and same Current chopping capability (chopping number) shall be used in above said simulation study/analysis.

c. To validate the results of above said simulation study/analysis report, the same study shall be carried out for capability of tested circuit breaker and the study/analysis results shall be comparable with actual Laboratory test and / or field test reports.

d. Laboratory test/ field test reports shall be submitted for 400 kV CBs in case there is change in design including change in following:

i. Different short circuit current capability

ii. Different model/type

vi) The breakers shall also withstand the voltages specified under clause **16.0** of this section.

2.6 CONTROLLED SWITCHING DEVICE (CSD) :

Circuit Breakers shall be equipped with controlled switching **device** with consequent optimization of switching behavior, when used in:

- Switching of transformer **(from 765kV and 400kV side circuit breakers only)**
- Switching of shunt Reactor

The CSD shall be provided in Circuit breaker of switchable line reactor **bay** and in Main & Tie **bay** circuit breakers of Transformers, line with non-switchable line reactors and Bus reactors. **The CSD shall be supplied as per bid price schedules.**

2.6.1 Technical Requirement for controlled switching device:

a) The CSD shall be designed to operate correctly and satisfactorily with the excursion of auxiliary A/C & DC voltages and frequency as specified in section - GTR.

b) The CSD shall meet the requirements **of IEC-61000-4-16 class IV** for HF disturbance test **(for short and long durations both)** and fast transient test shall be as per **IEC-61000-4-4 level IV** and insulation test as per IEC 60255–5.

c) The CSD shall have functions for switching ON & OFF the circuit breakers.

d) The CSD shall get command to operate the breakers manually. The controller shall be able to analyze the current and voltage waves available through the signals from secondaries of CTs & CVTs for the purpose of calculation of optimum moment of the switching the circuit breaker and issue command to circuit breaker to operate.

e) The CSD shall also have an adaptive control feature to consider the next operating time of the breaker in calculation of optimum time of issuing the switching command. In calculation of next operating time of the breaker, the CSD must consider all factors that may affect the operating time of the breaker such as, but not limited to, ambient temperature, control voltage variation, SF6 gas density variations etc. Schematic drawing for this purpose shall be provided by the contractor. The accuracy of the operating time estimation by the controller shall be better than **± 0.5 ms.**

f) The CSD should have display facility at the front for the display of settings and measured values.

g) The CSD shall be PC compatible for the setting of various parameters and down loading of the settings and measured values, date, time of switching etc. Window based software for this purpose shall be supplied by the contractor to be used on the owner's PC.

h) The controller shall be suitable for current input of 1 ampere from the secondary of the CTs. and 110 V (Ph to Ph) from the CVTs. The CSD shall **withstand** transient and dynamic state values of the current from the secondary of the CTs and CVTs.

i) The CSD shall have time setting resolution of 0.1 ms or better.

j) The CSD shall have sufficient number of output/input potential free contacts for connecting the monitoring equipment and annunciation system available in the control room. Necessary details shall be worked out during engineering of the scheme.

k) The CSD shall also record and monitor the switching operations and make adjustments to the switching instants to optimize the switching behavior as necessary. It shall provide self-diagnostic facilities, signaling of alarms and enable downloading of data captured from the switching events.

l) The provision for bypassing the Controlled switching device shall be provided through BCU and SCADA both **so that whenever, the CSD is not healthy due to any reason (including auxiliary supply failure), uncontrolled trip/close command can be extended to the circuit**

Breaker. Alternatively, in case of any non-operation of the CSD after receiving a close/trip command after a pre-determined time delay, the CSD should automatically be bypassed so as to ensure that the trip and close commands are extended to the Trip/Close coils **through subsequent command.**

m) The CSD shall be provided with a communication port to facilitate online communication of the CSD with Substation automation system directly on IEC 61850 protocols. If the CSD does not meet the protocols of IEC 61850, suitable gateway shall be provided to enable the communication of CSD as per IEC 61850.

3.0 TOTAL BREAK TIME

3.1 The total break time as specified under this section shall not be exceeded under any of the following duties:

i) Test duties T10, T30, T60, T100a, and T100s (with TRV as per IEC: 62271-100)

ii) Short line fault L75, L90 (with TRV as per IEC: 62271-100)

3.2 The total break time of the breaker shall not be exceeded under any duty conditions specified such as with the combined variation of the trip coil voltage (70-110%), arc extinguishing medium pressure etc. While furnishing the proof of the total break time of complete circuit breaker, the effect of non-simultaneity between contacts within a pole or between poles **shall be brought out to establish** guaranteed total break time.

3.3 The values guaranteed shall be supported with the type test reports.

4.0 CONSTRUCTIONAL FEATURES

The features and constructional details of circuit breakers shall be in accordance with requirements stated hereunder:

4.1 Contacts

4.1.1 The gap between the open contacts shall be such that it can withstand at least the rated phase to ground voltage for 8 hours at zero gauge pressure of SF6 gas due to the leakage. The breaker should be able to withstand all dielectric stresses imposed on it in open condition at lock out pressure continuously (i.e. 2 p.u. across the breaker continuously, for validation of which a power frequency dielectric with stand test conducted for a duration of at least 15 minutes is acceptable).

4.2 If multi-break interrupters are used, these shall be so designed and augmented that a uniform voltage distribution is developed across them. Calculations/

test reports in support of the same shall be furnished. The thermal and voltage withstand rating of the grading elements shall be adequate for the service conditions and duty specified.

4.3 The SF6 Circuit Breaker shall meet the following additional requirements:

a) The circuit breaker shall be single pressure type. The design and construction of the circuit breaker shall be such that there is a minimum possibility of gas leakage and entry of moisture. There should not be any condensation of SF6 gas on the internal insulating surfaces of the circuit breaker.

b) All gasketted surfaces shall be smooth, straight and reinforced, if necessary, to minimise distortion and to make a tight seal, the operating rod connecting the operating mechanism to the arc chamber (SF6 media) shall have adequate seals. The SF6 gas leakage should not exceed 0.5% per year and the leakage rate shall be guaranteed **during the warrantee period**. In case the leakage under the specified conditions is found to be greater than 0.5% **per** year **after** commissioning of circuit breaker **during the warrantee period**, the manufacturer will have to supply free of cost, the total gas requirement for subsequent ten (10) years, based on actual leakage observed during **the warrantee period**.

c) In the interrupter assembly there shall be an absorbing product box to minimise the effect of SF6 decomposition products and moisture. The material used in the construction of the circuit breakers shall be fully compatible with SF6 gas decomposition products.

d) Each pole shall form an enclosure filled with SF6 gas independent of two other poles (for 800, 420 & 245 kV CBs) and the SF6 density of each pole shall be monitored individually. For CBs of voltage class of 145 kV or less, a common SF6 scheme/density monitor shall be acceptable.

e) The dial type SF6 density monitor shall be adequately temperature compensated to model the pressure changes due to variations in ambient temperature within the body of circuit breaker as a whole. **Separate density monitor and dial type temperature compensated pressure guage is also acceptable.** The density monitor shall have graduated scale and it shall be possible to dismantle the density monitor for checking/replacement without draining the SF6 gas by providing suitable interlocked non return valve coupling.

f) Circuit Breaker shall be capable of withstanding a vacuum of minimum 8 millibars without distortion or failure of any part.

g) Sufficient SF6 gas **(including that will be required for gas analysis during filling)** shall be provided to fill all the circuit breakers **being supplied.** Spare gas shall be supplied in separate unused cylinders as per requirement specified in **BPS.**

4.4 Provisions shall be made for attaching an operational analyser to record contact travel, speed and making measurement of operating timings, pre insertion timings of closing resisters if used, synchronisation of contacts in one pole.

4.5 **The CO (Close-open) operation and its timing shall be such as to ensure complete travel/insertion of the contact during closing operation and then follow the opening operation.**

5.0 SULPHUR HEXAFLUORIDE GAS (SF6 GAS)

a) The SF6 gas shall comply with IEC 60376 and shall be suitable in all respects for use in the switchgear under the operating conditions.

b) The high pressure cylinders in which the SF6 gas is shipped and stored at site shall comply with requirements of the relevant standards and regulations. **SF6 gas shall be supplied (in returnable cylinders) for all circuit breakers. However, SF6 gas for spare circuit breakers and mandatory spare quantity of SF6 gas shall be supplied in non-returnable cylinders.**

c) Test: SF6 gas shall be tested for purity, dew point, air, **hydro-soluble** fluorides and water content as per IEC 60376 and test certificates shall be furnished to Employer indicating all the tests as per IEC 60376 for each lot of SF6 gas and Material safety datasheet shall be provided. Gas bottles should be checked for leakage during receipt at site.

6.0 INSULATORS

a) The porcelain**/polymer** of the insulators shall conform to the requirements stipulated under Section-GTR.

b) The mechanical characteristics of insulators shall match with the requirements specified under this section.

c) All **porcelain & polymer** hollow **column** insulators shall conform to IEC-62155 & **IEC-61462 respectively.**

d) Hollow Porcelain**/polymer** for pressurised columns/chambers should be in one integral piece in green and fired stage.

7.0 SPARE PARTS AND MAINTENANCE EQUIPMENT

The bidder shall include in his proposal, spare parts and maintenance equipment in accordance with BPS. Calibration certificates of each maintenance equipment shall be supplied along with the equipment.

8.0 OPERATING MECHANISM AND CONTROL

8.1 General Requirements

8.1.1 **Circuit breaker shall be operated by spring charged mechanism. The mechanism box shall meet the requirements of IP-55.**

8.1.2 The operating mechanism **box** shall be strong, rigid, **rebound free and shall be readily accessible for maintenance**.

8.1.3 The mechanism shall be anti-pumping and trip free under every method of closing.

8.1.4 The mechanism shall be such that the failure of any auxiliary spring will not prevent tripping and will not cause **unwanted** trip or closing operation of the Circuit Breaker

8.1.5 A mechanical indicator shall be provided to show open and close position of the breaker. It shall be located in a position where it will be visible to a man standing on the ground level with the mechanism housing closed. An operation counter shall also be provided in the **common marshalling box**.

8.1.6 Working parts of the mechanism shall be of corrosion resisting material, bearings which require grease shall be equipped with pressure type grease fittings. Bearing pin, bolts, nuts and other parts shall be adequately pinned or locked to prevent loosening or changing adjustment with repeated operation of the breaker.

8.1.7 The **contractor** shall furnish detailed operation and maintenance manual of the mechanism alongwith the operation manual for the circuit breaker. The instruction manuals shall contain exploded diagrams with complete storage, handling, erection, commissioning, troubleshooting, servicing and overhauling instructions.

8.1.8 Size of common marshalling Box shall be such that adequate space is available for working in the panel and all wiring shall be routed through non-inflammable wire troughs with covers.

8.1.9 Space shall be available in 765kV CB common marshalling box to mount monitoring device, of about 300x300x150mm size and of approximately 7kg weight, by the owner in future.

8.1.10 Operating mechanism and Marshalling box should be provided with space heater with thermostat, CFL/LED lamp and AC point /Socket.

8.2 **Control:**

8.2.1 The close and trip circuits shall be designed to permit use of momentary contact switches and push buttons.

8.2.2 Each breaker shall be provided with two (2) independent tripping circuits, pressure switches and coils each to be fed from separate DC sources.

8.2.3 The breaker shall normally be operated by remote electrical control. Electrical tripping shall be performed by shunt trip coils. However, provisions shall be made for local electrical control. For this purpose a local/remote selector switch and close and trip control switch/push buttons shall be provided in the Breaker **common marshalling box**.

8.2.4 The trip coils shall be suitable for trip circuit supervision during both open and close position of breaker.

8.2.5 Closing coil and associated circuits shall operate correctly at all values of voltage between 85% and 110% of the rated voltage. Shunt trip coil and associated circuits shall operate correctly under all operating conditions of the circuit breaker up to the rated breaking capacity of the circuit breaker and at all values of supply voltage between 70% and 110% of rated voltage. However, even at 50% of rated voltage the breaker shall be able to open. If additional elements are introduced in the trip coil circuit their successful operation and reliability for similar applications on outdoor circuit breakers shall be clearly brought out during detailed engineering.

8.2.6 The 765kV kV, 3-Phase circuit breakers suitable for single phase switching shall be suitable for taking a spare pole into service in case of any operational requirement and their marshalling box shall be suitable for accommodating the additional relays etc. required for changeover arrangement of all contacts, alarms, signals, indications, interlocks and lockouts.

8.2.7 In trip and closing circuits, relays/relay contacts shall preferably be used instead of contactors.

8.2.8 Controlled switching scheme/device, wherever required shall be considered as integral part of CB and shall be commissioned along with CB.

8.2.9 Density Monitor contacts and pressure switch contacts shall be **preferably** suitable for direct use as permissive in closing and tripping circuits. **The devices shall provide continuous & automatic monitoring of the state of the gas as follows:**

a) 'Gas Refill' level

This contact will be used for remote indication/ to annunciate the need for gas refilling.

b) 'SF6 gas density Low' Alarm level - 1
This contact will be used for remote indication/ to annunciate the need for the urgent gas refilling.

c) 'SF6 gas density Low' Alarm level - 2
This contact will be used to annunciate the need for gas refilling under emergency or trip the Circuit Breaker.

d) 'Breaker Block' level
This is the minimum gas density at which the manufacturer will guarantee the rated fault interrupting capability of the breaker. At this level the breaker block contact shall operate & the tripping & closing circuit shall be blocked.

It shall be possible to test all gas monitoring relays/devices without de-energizing the primary equipment & without reducing pressure in the main section. Plugs & sockets shall be used for test purposes. It shall also damp the pressure pulsation while filling the gas in service, so that flickering of the pressure switch contacts does not take place.

The density monitor shall be placed suitably inclined in such a way so that the readings are visible from ground level with or without using binoculars. Separate contacts have to be used for each of tripping and closing circuits. If contacts are not suitably rated and multiplying relays are used then fail safe logic/schemes are to be employed. DC supplies for all auxiliary circuits shall be monitored and provision shall be made for remote annunciations and operation lockout in case of D.C. failures. Density monitors are to be so mounted that the contacts do not change on vibration during operation of circuit Breaker.

8.2.10 The auxiliary switch of the breaker shall be positively driven by the breaker operating rod.

8.3 **Spring operated mechanism:**

a) Spring operated mechanism shall be complete with motor **as per manufacturer practice**. Opening spring and closing spring with limit switch for automatic charging and other necessary accessories to make the mechanism a complete operating unit shall also be provided.

b) As long as power is available to the motor, a continuous sequence of the closing and opening operations shall be possible. The motor shall have adequate thermal rating for this duty.

c) After failure of power supply to the motor one close open operation shall be possible with the energy contained in the operating mechanism.

d) Breaker operation shall be independent of the motor which shall be used solely for compressing the closing spring. Facility for manual charging of the closing spring shall also be provided. The motor rating shall be such that it requires not more than 30 seconds for full charging of the closing spring.

e) Closing action of circuit breaker shall compress the opening spring ready for tripping.

f) When closing springs are discharged after closing a breaker, closing springs shall be automatically charged for the next operation and an indication of this shall be provided in the local and remote control cabinet.

g) Provisions shall be made to prevent a closing operation of the breaker when the spring is in the partial charged condition. Mechanical interlocks shall be provided in the operating mechanism to prevent discharging of closing springs when the breaker is already in the closed position.

h) The spring operating mechanism shall have adequate energy stored in the operating spring to close and latch the circuit breaker against the rated making current and also to provide the required energy for the tripping mechanism in case the tripping energy is derived from the operating mechanism.

i) **The spring charging failure alarm shall be provided with a time delay relay having setting range from 0-1minute.**

j) **Separate MCBs shall be provided for each spring charging motor and the rating of MCBs shall be suitably selected to match the starting, running and stalling time.**

k) **An overload relay shall be provided for protection of the spring charging motor.**

9.0 SUPPORT STRUCTURE

a) The structure design shall be such that during operation of circuit breaker vibrations are reduced to minimum.

b) **Ladder and Maintenance platform for 400kV and 765kV Circuit breaker:**

A suitable ladder with the safety cage and a free standing maintenance platform with railing for each pole of the circuit breaker shall be supplied along with the equipment and it's support structure. The platform shall be suitable for maintenance personnel to stand and carryout the activities along with the tools and plant.
The ladder cum maintenance platform shall be designed as a free standing structure without taking any support from the main circuit breaker structure. The ladder having height more than 3.0m shall have at least 15 degree slope and is to be provided with safety guard above 2.0m level. All structural steel for the platform shall be as per IS: 2062 and to be galvanized. An indicative drawing of ladder and platform (Drg.Ref.: C-ENGG-IND.DWG-PLATFORM-CB, Rev.0) is added at page 27 of 27 with this specification for guidance which may be modified to suit the requirement of CB by CB manufacturer. However, the minimum size of the structural members shall be maintained as mentioned in the drawing.

c) **For 220kV, 132kV & 66kV circuit breakers a suitable platform cum ladder shall be provided as per manufacturer design.**

10.0 TERMINAL CONNECTOR PAD

The circuit breaker terminal pads shall be made up of high quality electrolytic copper or aluminium and shall be conforming to Australian Standard AS-2935 **or equivalent standard** for rated current. The terminal pad shall have protective covers which shall be removed before interconnections.

11.0 INTER-POLE CABLING

11.1 All cables to be used by contractor shall be armoured and shall be as per IS – 1554/ IEC-60502 (1100 Volts Grade). All cables within & between circuit breaker poles and its marshaling box and up to the controlled switching device is included in the scope of work. Special cables like screened cable if required for Circuit Breaker, **temperature Transducer/CB Status Signals for CSD** and its associated C&R panel shall be laid in 50mm diameter PVC pipe. Suitable supports for PVC pipe shall be included in the scope of Supply.

11.2 Only stranded conductor shall be used. Minimum size of the conductor for inter-pole control wiring shall be 1.5 sq.mm. Copper.

11.3 The cables shall be with oxygen index Minimum 29 and temperature index as $250^{o}C$ as per relevant standards.

11.4 **Separate cables shall be used for AC, DC-I, DC-II and selected DC.**

11.5 **All inter-pole cabling of Circuit breakers and up to common marshalling box shall be done by plug-in type arrangement. Suitable removable type**

encasing cover shall be provided in case plug-in type connection arrangement is provided exterior side of LCC/MB. The plug-in type cable termination shall be conforming to IP-67 as per IEC60529. Cable sealing arrangement shall be provided (as per requirement) to avoid entry of moisture etc.

11.6 **Vertical run of cables to the operating mechanism box shall be properly supported by providing the perforated closed type galvanized cable tray (Cable tray also to be supplied along with the Circuit Breaker) to be fixed as an integral part of the structures. The load of the cable shall not be transferred to the mechanism box/plug-in type terminal arrangement in any circumstances. Hanging or loose run of cable is not permitted. The drawing of cable tray including fixing arrangement shall be incorporated in the GA drawing of CB also.**

11.7 **Wiring** shall be done with stud type terminals and ring type lugs. More than two wires shall not be connected on each side of terminal.

12.0 FITTINGS AND ACCESSORIES

12.1 Following is **list of** some of the major fittings and accessories to be furnished by Contractor in the **common marshalling box**. Number and exact location of these parts shall be indicated **in the drawing**.

i) Cable glands (Double compression type), Lugs, Ferrules etc.

ii) Local/remote changeover switch.

iii) Operation counter

iv) Control switches to cut off control power supply.

v) Fuses/**MCBs** as required.

vi) The number of terminals provided shall be adequate enough to wire out all contacts and control circuits plus 24 terminals spare for future use.

vii) Anti-pumping relay.

viii) Pole discrepancy relay (for electrically ganged CBs).

ix) D.C. Supervision relays.

x) Rating plate description in accordance with IEC incorporating year of manufacture.

xi) Controlled switching **accessories** like sensors, timers, relays etc.(as applicable)

xii) **Transducers/Fixtures required for travel measurement shall be supplied by CB manufacturer. The complete set of Transducers/Fixtures for measurement of complete 3-phase CB shall be supplied for each station. Further, one set of gas filling adopter (Including coupling, regulator, connecting hose pipe up to ground level) shall be supplied as per BPS.**

13.0 ADDITIONAL DATA TO BE FURNISHED

a) Drawing, showing contacts in close, arc initiation, full arcing, arc extinction and open position.

b) The temperature v/s pressure curves for each setting of density monitor along with details of density monitor.

c) Method of checking the healthiness of voltage distribution devices (condensers) provided across the breaks at site.

d) Data on capabilities of circuit breakers in terms of time and number of operations at duties ranging from 100% fault currents to load currents of the lowest possible value without requiring any maintenance or checks.

e) **Maximum** non-simultaneity between contacts, between poles and **effect of the same on the** guaranteed total break time.

f) Sectional view of non-return couplings used for SF6 pipes.

g) Details & type of filters used in interrupter assembly and also the operating experience with such filters.

h) Details of SF6 gas:

   i) The test methods used in controlling the quality of gas used in the circuit breakers particularly purity and moisture content.

   ii) Proposed tests to assess the conditions of the SF6 within a circuit breaker after a period of service particularly with regard to moisture contents of the gas.

j) Shall furnish curves supported by test data indicating the opening time under close open operation with combined variation of trip coil voltage.

k) Detailed literature and schematic diagrams of switching mechanism for closing resistor showing the duration of insertion shall also be furnished alongwith the calculations in respect of thermal rating of resistors for the duties specified under clause **2.2.1** of this section in case of 420 kV **& 800kV** circuit breakers.

l) All duty requirements as applicable to 800 kV, 420 kV, 245 kV, 145 kV & 72.5kV CBs specified under Clause **2.0** of this section shall be provided with the support of adequate test reports.

14.0 DEAD TANK TYPE CIRCUIT BREAKER

14.1 In case dead tank type circuit breaker is offered, the Bidder shall offer bushing type CTs (whose secondary parameters are given in under **Section: Switchgear-Instrument Transformer** and in case of 765kV and 400kV these secondaries shall be provided in sets of 3 cores, i.e., 2 cores of PX class and one core of metering, on both sides of dead tank circuit breaker instead of conventional outdoor CTs.

14.2 The enclosure shall be made of either Al/Al Alloy or mild steel (suitably hot dip galvanized). The enclosure shall be designed for the mechanical and thermal loads to which it is subjected in service. The enclosure shall be manufactured and tested according to the pressure vessel codes {i.e., latest edition of the ASME code for pressure vessel - Section VIII of BS-5179, IS4379, IS-7311 (as applicable) and also shall meet Indian Boiler Regulations}.

The maximum temperature of enclosure with CB breaker carrying full load current shall not exceed the ambient by more than 20 deg C.

14.3 The enclosure has to be tested as a routine test at 1.5 times the design pressure for one minute. A bursting pressure test shall be carried out at 5 times the design pressure as type test on the enclosure.

15.0 TESTS

15.1 In accordance with the requirements stipulated under Section-GTR the circuit breaker alongwith its operating mechanism shall conform to **the type tests as per** IEC: 62271-100.

15.2 The type test reports **as per IEC** and the following additional type test reports shall also be submitted for purchaser's/**employer's** review:

i) Corona extinction voltage test (**procedure** as per Annexure-A of Section-GTR).

ii) Out of phase closing test as per IEC: 62271-100.

iii) Line charging interrupting current for proving parameters as per clause no. **16.0** of this section.

iv) Test to demonstrate the Power Frequency withstand capability of breaker in open condition at Zero Gauge pressure and at lockout pressure (Ref. Clause 4.1.1).

$ For Low & High temperature type test, Field performance report of CB's as per IEC 62271-100 revision 2008 (covering amendment-2 in 2017) is also acceptable as valid Type test report.

Applicable for :
1. Barmer-Sirohi package and,
2. Kurawar-Mandsaur package

v) Seismic withstand test **(procedure** as per Annexure-B of Section-GTR) in unpressurised condition.

vi) Verification of the degree of protection.

$ **vii) Low temperature test (applicable only for minimum ambient temperatures of less than (-) 10 deg.C application purpose) and High temperature test. Contractor can also submit the field performance report in line with IEC stipulations.**

Applicable For Mandsaur - Indore package

viii) Static Terminal Load test.

ix) Critical Currents test (if applicable).

x) Switching of Shunt Reactors. **Test reports shall be submitted as per IEC. Calculations shall be submitted for meeting the requirements of clause 2.3(v) of this section.**

xi) Circuit breakers meant for controlled switching shall conform to requirements of IEC/TR-62271 – 302. The contractor shall submit test reports to demonstrate that the offered CB conforms to the requirements of performance verification tests and parameter definition tests as per IEC/TR 62271-302. The contractor shall also furnish the report for the re-ignition free arcing window for switching 3-phase shunt reactor as demonstrated in the shunt reactor switching test.

15.3 **Routine Tests**

Routine tests as per IEC:62271-100 shall be performed on all circuit breakers.

In addition to the mechanical and electrical tests specified by IEC, the following tests shall also be performed.

i) Speed curves for each breaker shall be obtained with the help of a suitable operation analyzer to determine the breaker contact movement during opening, closing, auto reclosing and trip free operation under normal as well as limiting operating **control voltage conditions**. The tests shall show the speed of contacts directly at various stages of operation, travel of contacts, opening time, closing time, shortest time between separation and meeting of contacts at break make operation etc. This test shall also be performed at site for which the necessary operation analyzer along with necessary transducers, cables, console etc. shall be **arranged by the contractor at his own cost**.

ii) **During testing of CB, dynamic contact resistance measurement (DCRM) shall be carried out for close-open (CO) operations with delay of 300ms between close and trip operations. Minimum 100A**

current shall be injected for DCRM test. Travel characteristics, injected current, trip/close coil current shall also be recorded along with DCRM test.

iii) **Routine tests on Circuit breakers with Controlled switching device as per IEC/TR 62271-302.**

iv) **Tan delta and Capacitance measurement for grading capacitors at rated voltage and also at 10kV (for reference).**

16.0 TECHNICAL PARAMETERS FOR CIRCUIT BREAKER

(In addition to those indicated in section-GTR)

Sl. no.	**Parameter**	**765kV system**	**400kV system**	**220kV system**	**132 kV system**	**66 kV system**
1.	Rated voltage (Umax) kV (rms)	800	420	245	145	72.5
2.	Rated frequency (Hz)	50	50	50	50	50
3.	No. of poles	3	3	3	3	3
4.	Type of circuit breaker	SF6 gas insulated	SF6 gas insulated	SF6 gas insulated	SF6 gas insulated	SF6 gas insulated
5.	Rated continuous current (A) at an ambient temperature of 50^0C	3150/4000	2000/3150/ 4000 (as applicable)	1600/2500 (as applicable)	1250	1250
6.	Rated short circuit capacity with percentage of DC component as per IEC-62271-100 corresponding to minimum opening time under operating conditions specified.	50kA (As applicable)	40/50/63kA (As applicable)	40/50 kA (As applicable)	31.5kA	25kA
7.	Symmetrical interrupting capability kA (rms)	50	40/50/63 (As applicable)	40/50 (As applicable)	31.5	25
8.	Rated short circuit making current kAp	125	100/125/ 157.5 (As applicable)	100/125 (As applicable)	80	63
9.	Short time current carrying capability kA (rms)	50 for one second	40/50/63 As applicable for one second	40/50 As applicable for one second	31.5 for one second	25 for three second
10.	Out of phase breaking current carrying capability kA (rms)	12.5	10/12.5/15.75 (As applicable)	**As per IEC**	**As per IEC**	**As per IEC**
11.	Rated line charging interrupting current at 90 deg. Leading power factor angle (A rms) (The breaker shall be able to interrupt the rated line charging current with test voltage immediately before	900	600	As per IEC	As per IEC	As per IEC

	opening equal to the product of U/√3 and 1.4 as per IEC-62271-100					
12.	First pole to clear factor	1.3	1.3	1.3	1.3	1.5
13.	Temperature rise over an ambient temperature of 50^0C	As per IEC: 62271-100	As per IEC: 62271-100	As per IEC: 62271-100	As per IEC: 62271-100	As per IEC: 62271-100
14.	Rated break time as IEC (ms)	40	40	60	60	Less than 75
15.	Total break time (ms)	45	45	65	65	Less than 80
16.	Total closing time (ms)	Not more than 150	Not more than 150	Not more than **150**	Not more than **150**	Not more than **150**
17.	Operating mechanism or a combination of these	Spring	Spring	Spring	Spring	Spring
18.	Rated operating duty cycle	O-0.3s-CO-3 min-CO	O-0.3s-CO-3 min-CO	O-0.3s-CO-3 min-CO	O-0.3s-CO-3 min-CO	O-0.3s-CO-3 min-CO
19.	Reclosing	Single phase &Three phase auto reclosing.	Single phase &Three phase auto reclosing.	Single phase &Three phase auto reclosing.	Three phase auto reclosing. (Single phase auto reclosing if specified in section-project)	Three phase auto reclosing.
20.	Pre-insertion resistor requirement	As per BPS	As per BPS	NA	NA	NA
i)	Rating (ohms)	450(max.) with tolerance as applicable	400(max.) with tolerance as applicable	NA	NA	NA
ii)	Minimum electrical (mechanical insertion time +pre-arcing time) pre-insertion time (ms)	9	8	NA	NA	NA
iii)	Opening of PIR contacts	PIR contacts should open immediately after closing of main contacts OR At least 5 ms prior to opening of main contacts at rated air/gas pressure where the	PIR contacts should open immediately after closing of main contacts OR At least 5 ms prior to opening of main contacts at rated air/gas pressure where the	NA	NA	NA

		PIR contacts remain closed	PIR contacts remain closed			
21.	Max. difference in the instants of closing/opening of contacts (ms) between poles at rated control voltage and rated operating & quenching media pressures	2.5(within a pole) 3.3(opening) 5.0(closing)	2.5(within a pole) 3.3(opening) 5.0(closing)	3.3(opening) 5.0(closing)	3.3(opening) 3.3(closing)	As per IEC
22.	Maximum allowable switching over voltage under any switching condition	1.9 p.u.	2.3 p.u.	As per IEC	As per IEC	As per IEC
23.	Trip coil and closing coil voltage with variation as specified	220V DC	220V DC	220V DC	220V DC or 110V DC	220V DC or 110V DC
24.	Noise level at base and up to 50 m distance from base of circuit breaker	As per IEC	140dB (max.)	140dB (max.)	140dB (max.)	140dB (max.)
25.	Rating of Auxiliary contacts	10A at 220V DC	10A at 220V DC	10A at 220V DC	10A at 220V DC	10A at 220V DC
26.	Breaking capacity of Aux. Contacts	2A DC with circuit time constant not less than 20ms	2A DC with circuit time constant not less than 20ms	2A DC with circuit time constant not less than 20ms	2A DC with circuit time constant not less than 20ms	2A DC with circuit time constant not less than 20ms
27.	**Rated insulation levels**					
i)	Full wave impulse withstand (1.2 /50 µs) between line terminals and ground	±2100kVp	±1425 kVp	±1050 kVp	±650 kVp	±325 kVp
ii)	Full wave impulse withstand (1.2 /50 µs) between terminals with circuit breaker open	2100kVp impulse on one terminal & 455 kVp power frequency voltage of opposite polarity on the other terminal	1425 kVp impulse on one terminal & 240 kVp power frequency voltage of opposite polarity on the other terminal	±1050 kVp	+ 650kVp	±325 kVp
iii)	Rated switching impulse withstand voltage (250/2500 µs) Dry & wet between line terminals and ground	+ 1550kVp	+1050 kVp .	NA	NA	NA
iv)	Rated switching impulse withstand voltage (250/2500 µs) Dry &wet Between terminals with circuit breaker open	1175kVp impulse on one terminal & 650 kVp power frequency	900 kVp impulse on one terminal & 345 kVp power frequency	NA	NA	NA

		voltage of opposite polarity on the other terminal	voltage of opposite polarity on the other terminal			
v)	One minute power frequency dry withstand voltage between line terminals and ground	830kV rms	520 kV rms.	460 kV rms.	275 kV rms	140 kV rms
vi)	One minute power frequency dry withstand voltage between terminals with circuit breaker open	1150kV rms	610 kV rms.	460 kV rms.	275 kV rms	160 kV rms
28.	Minimum corona extinction voltage with CB in all positions	508 kV rms	320kV rms	156 kV rms	92 kV rms	NA
29.	Max. radio interference voltage for frequency between 0.5 MHz and 2 MHz (Micro volts)	2500 µV (at 508kV rms)	1000 µV (at 266kV rms)	1000 µV (at 156kV rms)	500µV (at 92kV rms)	NA
30.	Minimum Creepage distance*					
i)	Phase to ground (25mm/kV)	20000mm	10500mm	6125mm	3625mm	1813mm
ii)	Between CB terminals	18000mm	10500mm	6125mm	3625mm	1813mm
31.	System neutral earthing	Effectively earthed				
32.	Rated terminal load	As per IEC or as per the value calculated based on specific switchyard layout requirement, whichever is higher.				
33.	Auxiliary contacts	Besides requirement of technical specification, the manufacturer/contractor shall wire up 10 NO + 10 NC contacts exclusively for purchaser's use and wired up to common marshalling box.				
34.	No. of terminals in common marshalling box	All contacts & control circuits to be wired out up to common marshalling box + minimum 24 terminals exclusively for purchaser's future use				
35.	Seismic level	0.5g horizontal for the site location under the Zone-V as per IS-1893 0.3g horizontal for the site location under other than the Zone-V as per IS-1893				

*** The values indicated are for specific creepage of 25mm/kV. In case of specific creepage of 31mm/kV specified, the Minimum Creepage distance values shall be concidered proportionately.**

17.0 PRE-COMMISSIONING TESTS

17.1 An indicative list of tests is given below. All routine tests except power frequency voltage dry withstand test on main circuit breaker shall be repeated on the completely assembled breaker at site. For Pre-commissioning tests, procedures and formats for circuit breakers, POWERGRID document no. CF/CB/03/R-4 dated 01/04/2013 of document no. D-2-01-03-01-04 dated 01-04-2013 will be the reference document. This document will be available at respective sites and shall be referred by the contractor. Contractor shall perform any additional test based on specialties of the items as per the field Q.P./instructions of the equipment Supplier or Employer without any extra cost to the Employer. The Contractor

shall arrange all instruments required for conducting these tests alongwith calibration certificates and shall furnish the list of instruments to the Employer for approval.

(a) Insulation resistance of each pole.

(b) Check adjustments, if any suggested by manufacturer.

(c) Breaker closing and opening time.

(d) Slow and Power closing operation and opening.

(e) Trip free and anti pumping operation.

(f) Minimum pick-up voltage of coils.

(g) Dynamic Contact resistance measurement.

(h) Functional checking of control circuits interlocks, tripping through protective relays and auto reclose operation.

(i) Insulation resistance of control circuits, motor etc.

(j) Resistance of closing and tripping coils.

(k) SF6 gas leakage check.

(l) Dew Point Measurement

(m) Operation check of pressure switches and gas density monitor during gas filling.

(n) Checking of mechanical ‘CLOSE’ interlock, wherever applicable.

(o) Testing of grading capacitor.

(p) Resistance measurement of main circuit.

(q) Checking of operating mechanisms

(r) Check for annunciations in control room.

(s) Point of wave switching test (wherever applicable)

17.2 The contractor shall ensure that erection, testing and commissioning of circuit breaker shall be carried out under the supervision of the circuit breaker manufacturer's representative. The commissioning report shall be signed by the manufacturer’s representative.

18.0 ACTIONS REQUIRED FOR DEFECTS OBSERVED DURING DEFECT LIABILITY PERIOD

The actions required to be taken by contractor in case of defects observed in AIS type Circuit Breakers of ratings 132kV & above during the warranty period (defect liability period) shall be as per following. Further, the replaced/repaired/ refurbished equipment (or part of equipment) shall have warranty in line with the GCC clause 22 in SCC.

Sl.no.	Nature of problem	Corrective measures to be taken by contractor
1.	Blasting of interrupter, PIR, pole column,	Replacement of compete CB pole Including SF6 gas
	a. Abnormal DCRM and Travel Measurement b. Contact assembly and internal component damage, misalignment not leading to complete failure of interrupter/ PIR	Repair/replacement of affected assembly/ component based on repair procedure approved by QA
2.	Crack in insulator, cementing joint of interrupter , PIR , pole column	Replacement of affected part
3.	SF6 gas leakage from sealing and bolted joints. SF6 gas leakage detectable by any Leakage Detection Method	Rectification by replacement of gasket, O-ring, sealing, Interrupter or affected part to be replaced etc If unable to arrest the leakage in 02 attempts, replacement of interrupter/ column
4.	SF6 gas low dew point: > (-)35 deg C at atmospheric pressure.	Re-conditioning of gas. If does not improve, complete evacuation of CB, replacement filter material and gas
5.	Oil leakage of grading capacitor Change in Capacitance value beyond +/- 5 % w.r.t. to value of Capacitance obtained at site during pre-commissioning test.	Replacement or Refurbishment of grading capacitor
6.	Pole/ break discrepancy (during O&M) Limits: Break to Break (Opening/Closing) : max. 2.5 ms Phase to Phase (Opening) : max. 3.33 ms Phase to Phase (Closing) : max 5 ms	Rectification/replacement of affected parts
7.	Static Contact Resistance: increase >50% from factory/ pre-commissioning value or >75 micro-ohm/ break whichever is lower	Rectification/Replacement of pole
8.	Drive mechanism assembly failure	Rectification/ Replacement of affected part
9.	Trip/ close coil, density monitor, relays and contactors and components of common MB	Replacement of affected part

Note: 1) Replaced/Repaired/Refurbished Equipment (or part of equipment) shall have 2 years warranty without prejudice to contractual warranty period.

2) The measurement at site shall be carried out as per POWERGRID standard Pre-commissioning procedures as indicated in Technical Specification.

GENERAL NOTES
1. ALL DIMENSIONS ARE IN MM.
2. ALL STRUCTURAL STEEL SHALL BE AS PER IS:2062 & FABRICATION SHALL BE AS PER IS:802.
3. BOLTS, NUTS SHALL BE AS PER IS:1367 (PROPERTY CLASS 5.6)
4. ALL MEMBERS, BOLTS, NUTS, WASHERS SHALL BE HOT DIP GALVANISED AS PER IS 2614.
5. THE MINIMUM THICKNESS OF GALVANISATION SHALL BE SAME AS THAT OF THE CB SUPPORT STRUCTURE.
6. SPRING WASHERS SHALL BE AS PER IS 1573 AND MAY BE HOT DIP / ELECTRO GALVANISED AS PER MANUFACTURER SPECIFICATION.
7. ALL HOLES 17.5MM DIA FOR 16MM DIA BOLT UNLESS NOTED OTHERWISE.
8. WELDING SHALL BE DONE AS PER I.S. : 816.
9. ALL ITEMS TO BE PREFIXED WITH "PCB" THAT IS PCB-1, PCB-2, SO ON.
10. POSITION OF LADDER SHOWN IS INDICATIVE AND THE SAME SHALL BE SUITABLY POSITIONED BY CB MANUFACTURER DURING DETAILED ENGINEERING.
11. ORIENTATION OF PLATFORM CUM LADDER SHALL BE SUITABLY SHOWN ON OGA OF CIRCUIT BREAKER DURING DETAILED ENGINEERING BY CB MANUFACTURER ALONG WITH CB MAIN SUPPORT STRUCTURE.
12. THE AXB DIMENSION SHALL BE THE OVERALL LENGTH AND WIDTH OF THE CB STRUCTURE INCLUDING THE MECHANISM BOX OF CB AT PLATFORM LEVEL.
13. THE MEMBER SIZES SHOWN FOR PLATFORM SUPPORT STRUCTURE AND BRACINGS ARE INDICATIVE. THE SAME MAY BE VARY AS PER DURING DETAILED ENGINEERING. HOWEVER, THE MEMBER SIZES SHALL NOT BE LESS THAN THE MINIMUM SECTION SIZES SHOWN IN THIS DRAWING.
CB SUPPORT STRUCTURE AS PER VENDOR DRAWING.
900MM HIGH SAFETY RAILING ALL AROUND BY USING SUITABLE TUBULAR SECTIONS AND MS FLAT
BEAM TO SUPPORT CHEQ.PLATE (MIN:ISMC75)
MAIN LEGS (FOUR CORNERS) MIN: ISMC100
BRACING AS PER DESIGN (MIN:50X50X6)
*Structure height shall be suitably decided by CB Manufacturer
* THE PLATFORM LEVEL SHALL BE 1METRE BELOW THE BOTTOM OF THE MECHANSIM BOX.
300
300
300
25 DEG
600mm WIDE LADDER WITH SAFETY CAGE MIN:ISA75X75X6
SECTION X-X
600 (minimum)
600 (minimum)
75 (MIN)
75 (MIN)
75 (MIN)
1200 (minimum)
8MM THICK GALVANISED CHEQUERED PLATE AS PER MANUFACTURER SPECIFICATION.
BEAMS TO SUPPORT CHEQUERED PLATE
THE SIZE OF THE CB STRUCTURE (AXB) AS PER VENDOR DESIGN AT PLATFORM LEVEL
75MM GAP BETWEEN THE CB STRUCTURE& PLATFORM ALL AROUND
LADDER WITH SAFETY CAGE
IN 15 DEGREE SLOPE
600
PLAN AT PLATFORM LEVEL
POWER GRID CORPORATION OF INDIA LIMITED
(A Government of India Enterprise)
TITLE:
INDICATIVE DRAWING FOR PLATFORM DETAILS OF 400Kv & 765kV CIRCUIT BREAKER
DRG.NO.
C-ENGG-IND.DWG-PLATFORM-CB
SHEET 01 OF 01
SCALE
NTS
REV
0
DATE
ACDE ENGG-CVL
CDE ENGG-CVL
AGM ENGG-SS
AGM ENGG-CVL
GM ENGG-SS
GM ENGG-CVL

SECTION-3

Refer document

General Technical Requirements: TB-431-316-000 Rev 00.

BHARAT HEAVY ELECTRICALS LIMITED

TRANSMISSION BUSINESS ENGINEERING MANAGEMENT

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DOCUMENT No.	**TB-431-316-000**	Rev. No.	**00**		Prepared	Checked	Approved
TYPE OF DOC.	**TECHNICAL SPECIFICATION**			SIGN			
TITLE	**GENERAL TECHNICAL REQUIREMENTS-SECTION 3**			NAME	PC	JK	VK
				DATE			
				GROUP	TBEM	W.O.	**431**

CUSTOMER	**Power Grid Corporation of India Limited** (POWERGRID)
Station	Powergrid Sub-Stations
Project	1. 765/400/220kV Barmer-I (New), 765kV Sirohi(Extn.) and 400kV Fatehgarh-III (Extn.) 2. 765/400/220/132kV Kurawar (New), 400kV Shujalpur(Extn.), 400kV Ashtha (Extn.) 765kV Mandsaur (Extn.) 3. 765/400/220kV Mandsaur (New), 765kV Indore (Extn.)

S.No.	Description	Sheet
1	Site Information	1
2	General Technical Requirements	30
3	Annexure -A	2
4	Annexure -B	1
5	Annexure -C	23
6	Annexure -G	6
7	Annexure -J	4
8	Annexure -K (Rev. 01)	2
9	Annexure- S1 (Size of control and Power cables)	4

RevNo.	Date	Altered	Checked	Approved	REVISION DETAILS

Distribution	To	TBEM	TBMM	TBQM	Supplier
	Copies	1	1	1	4

Site Information -1

S.No.	Particular	Details
a)	Owner	Power Grid Corporation of India Limited (POWERGRID)
b)	Customer	Power Grid Corporation of India Limited (POWERGRID)
c)	Project Title	**765kV AIS Pkg SS-46T** for (a) Establishment of 765/400/220kV Barmer-I including 400kV, 2x125 MVAr Reactor; (b) Extn at 765kV Sirohi for termination of Barmer-I PS– Sirohi PS 765 kV D/c line; (c) Extn of 400kV Fatehgarh-III for termination of Fatehgarh-III (Section-2) PS – Barmer-I PS 400 kV D/c line
d)	Location	Barmer-I /Sirohi / Fatehgarh-III (Rajasthan)
e)	Transport Facilities	Nearest Rail Head for : **765/400/220kV Barmer –** Barmer Railway Station **765/400/220kV Sirohi –** Sirohi Railway Station **765/400/220kV Fatehgarh –** Fatehgarh Railway Station
SITE CONDITIONS		
f)	Max. ambient air temp.	50°C
g)	Min. ambient air temp.	0°C
h)	Max. design ambient temp.	50°C
i)	Costal area consideration	No
j)	Altitude above sea level	Less than 1000 meter above mean sea level (MSL)
k)	Seismic Zone	NBC2016
l)	Wind Zone	NBC2016
m)	Snow fall	NIL
	Main Electrical Parameters:	
n)	Fault Levels:	765kV: 50kA for 1 Sec 400kV: 63kA for 1 Sec 220kV: 50kA for 1 sec
o)	Creepage Distance	25mm/kV for All Equipment i.e. BPI/Bushings, CB, Isolator, CT, CVT, LA, WT, NCT etc. and for insulator string/ long rod insulators/ outdoor bushings - 31 mm/kV

Site Information - 2

S.No.	Particular	Details
a)	Owner	Power Grid Corporation of India Limited (POWERGRID)
b)	Customer	Power Grid Corporation of India Limited (POWERGRID)
c)	Project Title	**765kV AIS Pkg SS-47T** for (a) Establishment of 765/400/220/132kV Kurawar Substation (New) including 1x125MVAr 420kV (3-Ph)Bus Reactor, (b) Extn of 400kV Shujalpur for termination of 400kVD/C Shujalpur – Kurawar TL, (c) Extn of 400kV Ashtha S/s for LILO of one circuit of Indore-Itarsi 400 kV D/c line at Ashtha & for termination of Kurawar-Ashtha 400 kV D/c line and (d) Extn of 765kV Mandsaur for termination of Mandsaur – Kurawar 765 kV D/c line.
d)	Location	Kurawar / Shujalpur / Ashtha / Mandsaur **(Madhya Pradesh)**
e)	Transport Facilities	Nearest Rail Head for : **765/400/220/132kV Kurawar –** Sehore Railway Station **400kV Shujalpur –** Shujalpur Railway Station **400kV Ashtha –** Sehore Railway Station **765kV Mandsaur –** Mandsaur Railway Station
SITE CONDITIONS		
f)	Max. ambient air temp.	50°C
g)	Min. ambient air temp.	0°C
h)	Max. design ambient temp.	50°C
i)	Costal area consideration	No
j)	Altitude above sea level	Less than 1000 meter above mean sea level (MSL)
k)	Seismic Zone	NBC2016
l)	Wind Zone	NBC2016
m)	Snow fall	NIL
	Main Electrical Parameters:	
n)	Fault Levels:	765kV: 50kA for 1 Sec 400kV: 63kA for 1 Sec 220kV: 50kA for 1 sec 132kV: 40kA for 1 sec
o)	Creepage Distance	25mm/kV for All Equipment i.e. BPI/Bushings, CB, Isolator, CT, CVT, LA, WT, NCT etc. and for insulator string/ long rod insulators/ outdoor bushings - 31 mm/kV

Site Information - 3

S.No.	Particular	Details
a)	Owner	Power Grid Corporation of India Limited (POWERGRID)
b)	Customer	Power Grid Corporation of India Limited (POWERGRID)
c)	Project Title	**Substation Package -SS-43T for (a) Establishment of 765/400/ 220kV Mandsaur S/s including 400kV, 2x125MVAr (3-Ph) Reactor and (b) Extn. of 765kV Indore (PG) for termination of Mandsaur PS – Indore (PG) 765 kV D/c Line associated with "Transmission system for evacuation of power from Rajasthan REZ Ph-IV (Part-2 : 5.5GW) Jaisalmer/Barmer Complex)Part-C"**
d)	Location	**Mandsaur & Indore, Madhya Pradesh**
e)	Transport Facilities	Road/Train Nearest Rail Head For **765/400/220kV Mandsaur (New) PS -** Mandsaur Nearest Rail Head For **765/400kV Indore (PG) S/S -** Indore
	SITE CONDITIONS	
f)	Max. ambient air temp.	50°C
g)	Min. ambient air temp.	0°C
h)	Max. design ambient temp.	50°C
i)	Costal area consideration	No
j)	Altitude above sea level	Less than 1000 meter above mean sea level (MSL)
k)	Seismic Zone	NBC2016
l)	Wind Zone	NBC2016
m)	Snow fall	NIL
	Main Electrical Parameters:	
n)	Fault Levels:	765kV: 50kA for 1 Sec 400kV: 63kA for 1 Sec 220kV: 50kA for 1 sec
o)	Creepage Distance	25mm/kV for All Equipment i.e BPI/Bushings, CB, Isolator, CT, CVT, LA, WT, NCT etc. and for insulator string/ long rod insulators/ outdoor bushings - 31 mm/kV

GENERAL TECHNICAL REQUIREMENTS - SECTION 3

1.0 FOREWORD

The provisions under this section are intended to supplement requirements for the materials, equipment's and services covered under other sections of tender documents and are not exclusive.

The Supplier shall note that the standards mentioned herein are not mutually exclusive or complete in themselves, but are intended to complement each other, with minimum repetition, to define the requirements of the Specification. In the event of a conflict between requirements of any two clauses of the Specification/ documents or requirements of different codes/ standards specified, the more stringent requirement as per the interpretation of the owner shall apply, unless confirmed otherwise by the owner in writing based on a written request from the Supplier.

In case of conflicting requirements between this document (General Technical Requirement Section 3) and equipment specification (Section 1 & Section 2), equipment specification shall prevail.

When specific requirements stipulated in the Specification exceed or change those required by the applicable standards, the stipulations of the Specification shall take precedence.

Unless specifically agreed to by the Purchaser prior to Award of Contract, the Work shall be in accordance with the standards indicated and the requirements of the Specification. The Supplier shall be held responsible for any deviation.

In case of conflict between the various standards, the decision of owner shall be binding & final.

The following words and expressions shall have the meanings hereby assigned to them throughout this document

"Employer/Owner" means Power Grid Corporation of India Ltd.

"Purchaser" means Bharat Heavy Electricals Limited.

"Supplier/Manufacturer/Bidder" means the person or persons, firm or company assigned to execute the works as defined by the scope of supply, described here.

"Specification" refers to this document.

The supplier should be approved by Power Grid. If not, it is the responsibility of the vendor to be assessed and approved by Power Grid, before placement of order by BHEL. Any cost involved in vendor

assessment/approval must be borne by the vendor himself.

2.0 GENERAL REQUIREMENT

2.1 a) All equipment/materials/items, as applicable under present scope of works, shall be supplied by domestic manufacturers only with **minimum Local Content for individual items as listed annexure-K (rev.01)**

Any imported equipment/material/item/parts/component (comprising of embedded systems) to be supplied under the contract shall be tested in the certified laboratories to check for any kind of embedded malware/trojans/cyber threats and for adherence to Indian Standards as per the directions issued by Ministry of Power/Govt. of India from time to time. In case of such import from specified "prior reference" countries, the requirement of prior permission from the Govt. of India including protocol for testing in certified and designated laboratories by Ministry of Power/Govt. of India shall also be complied with by the Bidder.

The bidder/contractor shall list out the products and components producing Toxic e-waste under the contract and shall furnish to the Employer the procedure of safe disposal at the time of closing of the contract.

2.1 b) The Supplier/Manufacturer shall furnish catalogues, engineering data, technical information, design documents, drawings etc., fully in conformity with the technical specification during detailed engineering.

2.2 It is recognised that the Bidder may have standardised on the use of certain components, materials, processes or procedures different from those specified herein. Alternate proposals offering similar equipment based on the manufacturer's standard practice will also be considered provided such proposals meet the specified designs, standard and performance requirements and are acceptable to Employer.

2.3 Wherever a material or article is specified or defined by the name of a particular brand, Manufacturer or Vendor, the specific name mentioned shall be understood as establishing type, function and quality and not as limiting competition.

2.4 Equipment furnished shall be complete in every respect with all mountings, fittings, fixtures and standard accessories 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 unless included in the list of exclusions. Materials and components which are minor in nature and incidental to the requirement but not specifically stated in the specification, which are necessary for commissioning and satisfactory operation of the switchyard/ 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.

2.5 Deleted.

2.6 Deleted.

3.0 STANDARDS

3.1 The works covered by the specification shall be designed, engineered, manufactured, built, tested and commissioned in accordance with the Acts, Rules, Laws and Regulations of India.

3.2 The equipment offered by the Bidder shall at least conform to the requirements specified under relevant IS standard. In case of discrepancy between IS and other international standard, provisions of IS shall prevail. The Bidder shall also note that the list of standards presented in Annexure-C is not complete. Whenever necessary, the list of standards shall be considered in conjunction with specific IS. If the IS standard is not available for an equipment/material, then other applicable International standard (IEC/Equivalent), as per the specification, shall be accepted.

3.3 The Bidder shall note that standards mentioned in the specification are not mutually exclusive or complete in themselves, but intended to complement each other.

3.4 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.

3.5 Other internationally accepted standards which ensure equivalent or better performance than that specified in the standards specified under Annexure-C / individual sections for various equipments shall also, be accepted, however the salient points of difference shall be clearly brought out during detailed engineering along with English language version of such standard. The equipment conforming to standards other than specified under Annexure-C /individual sections for various equipments shall be subject to Employer's approval.

4.0 SERVICES TO BE PERFORMED BY THE EQUIPMENT BEING FURNISHED

4.1 Switching surge over voltage and power frequency over voltage is specified in the system parameters below. In case of the 400kV system, the initial value of the temporary overvoltages could be 2.0 p.u. for 1-2 cycles. The equipment furnished under this specification shall perform all its functions and operate satisfactorily without showing undue strain, restrike etc under such over voltage conditions.

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

4.3 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.

4.4 The Bidder shall design terminal connectors of the equipment taking into account various forces as above at Sl.No.4.3 that are required to withstand.

4.5 The equipment shall also comply to the following:

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

b) All piping, if any between equipment control cabinet/operating mechanism to marshalling box of the equipment, shall bear proper identification to facilitate the connection at site.

4.6 **System Parameter**

765kV, 400kV & 220kV System

SL No	Description of parameters	765kV System	400kV System	220kV System
1.	System operating voltage	765kV	400kV	220kV
2.	Maximum operating voltage of the system (rms)	800kV	420kV	245kV
3.	Rated frequency	50Hz	50Hz	50Hz
4.	No. of phase	3	3	3
5.	Rated Insulation levels			
i)	Full wave impulse withstand voltage (1.2/50 microsec.)	2100kVp	1550kVp	1050 kVp
ii)	Switching impulse withstand voltage (250/2500 micro sec.) dry and wet	1550kVp	1050kVp	-
iii)	One minute power frequency dry withstand voltage (rms)	830kV	630kV	-
iv)	One minute power frequency dry and wet withstand voltage (rms)	-	-	460kV
6.	Corona extinction voltage	508kV	320kV	-
7.	Max. radio interference voltage for frequency between 0.5 MHz and 2 MHz	2500 µV at 508kV rms	1000 µV at 266kV rms	1000 µV at 156kV rms
8.	Minimum creepage distance - for Equipment other than Insulator string	20000 mm	10500 mm	6125 mm
	Minimum creepage distance - for Insulator String	24800 mm	13020 mm	7595 mm
9.	Min. clearances			
i.	Phase to phase	7600mm (for conductor conductor configuration) 9400mm (for rod -conductor configuration)	4000mm (for conductor conductor configuration) 4200mm (for rod - conductor configuration)	2100 mm
ii.	Phase to earth	4900mm (for conductor-structure)	3500 mm	2100 mm

		6400mm (for rod- structure)		
iii)	Sectional clearances	10300 mm	6500 mm	5000 mm
10.	Rated short circuit current for 1 sec. duration	50kA	63 kA	50kA
11.	System neutral earthing	Effectively earthed	Effectively earthed	Effectively earthed

66kV, 52kV and 33kV System

SL No	**Description of parameters**	**66kV System**	**52 kV System**	**33 kV System**
1.	System operating voltage	66kV	52kV	33kV
2.	Maximum operating voltage of the system(rms)	72.5kV	52kV	36kV
3.	Rated frequency	50Hz	50Hz	50Hz
4.	No. of phase	3	3	3
5.	Rated Insulation levels			
i)	Full wave impulse withstand voltage (1.2/50 microsec.)	325 kVp	250 kVp	170 kVp
ii)	One-minute power frequency dry and wet withstand voltage (rms)	140kV	95kV	70kV
6.	Max. radio interference voltage for frequency between 0.5 MHz and 2 MHz	-	-	-
7.	Minimum creepage distance	1813 mm (2248mm for coastal area)	1300mm (1612 mm for coastal area)	900 mm (1116m m for coastal area)
8.	Min. Clearance			
i.	Phase to phase	750 mm	530mm	320 mm
ii.	Phase to earth	630 mm	480mm	320 mm
iii.	Sectional clearances	3100 mm	3100mm	2800 mm
9.	Rated short circuit current	25kA for 3 Sec*	25kA for 1 Sec	25 kA for 3 sec
10.	System neutral earthing	Effectively earthed	Effectively earthed	Effectively earthed

Notes:

1. The above parameters are applicable for installations up to an altitude of 1000m above mean sea level. For altitude exceeding 1000m, necessary altitude correction factor shall be applicable as per relevant IEC/IS.
2. The insulation and RIV levels of the equipments shall be as per values given in the Technical Specification of respective equipment.

3. Corona and radio interference voltage test and seismic withstand test procedures for equipments shall be in line with the procedure given at **Annexure-A** and **Annexure-B** respectively.

4. "*" For tertiary loading Equipment's fault level shall be 25kA for 3 Sec.

5.0 ENGINEERING DATA AND DRAWINGS

5.1 Deleted.

5.2 Deleted.

5.3 Drawings

5.3.1 All drawings submitted by the Bidder shall be in sufficient detail to indicate the type, size, arrangement, material description, Bill of Materials, weight of each component, break-up for packing and shipment, dimensions, internal & the external connections, fixing arrangement required and any other information specifically requested in the specifications.

5.3.2 Drawings submitted by the Bidder shall be clearly marked with the name of the Employer, the unit designation, the specifications title, the specification number and the name of the Project. POWERGRID has standardized a large number of drawings/documents of various make including type test reports which can be used for all projects having similar requirements and in such cases no project specific approval (except for list of applicable drawings alongwith type test reports) is required. However, distribution copies of standard drawings/documents shall be submitted as per provision of the contract. All titles, noting, markings and writings on the drawing shall be in English. All the dimensions should be in SI units.

5.3.3 The review of these data by the Employer will cover only general conformance of the data to the specifications and documents, interfaces with the equipment provided under the specifications, external connections and of the dimensions which might affect substation layout. This review by the Employer may not indicate a thorough review of all dimensions, quantities and details of the equipment, materials, any devices or items indicated or the accuracy of the information submitted. This review and/or approval by the Employer shall not be considered by the Contractor, as limiting any of his responsibilities and liabilities for mistakes and deviations from the requirements, specified under these specifications and documents.

5.5 All manufacturing and fabrication work in connection with the equipment prior to the approval of the drawings shall be at the Bidder's risk. The Bidder may make any changes in the design which are necessary to make the equipment conform to the provisions and intent of the Contract and such changes will again be subject to approval by the Employer. Approval of Bidder's drawing or work by the Employer shall not relieve the bidder of any of his responsibilities and liabilities under the Contract.

5.6 All engineering data submitted by the Bidder after final process including review and approval by the Employer shall form part of the Contract Document and the entire works performed under these specifications shall be performed in strict conformity, unless otherwise expressly requested by the Employer in Writing.

5.7 Approval Procedure

The following schedule shall be followed generally for approval and for providing final documentation.

i)	Approval/comments/ by Employer on initial submission	15 days
ii)	Resubmission (whenever required)	Within 3 (three) weeks from date of comments
iii)	Approval or comments	Within 3 (three) weeks of receipt of resubmission
iv)	Furnishing of distribution copies (2 hard copies to each substation and one scanned copy (pdf format)	Within 3 (three) weeks of receipt of resubmission
v)	Furnishing of distribution copies of test reports	
	a) Type test reports (one scanned softcopy in pdf format to each substation plus one for corporate centre & one hardcopy per substation)	2 weeks from the date of final approval
	b) Routine Test Reports (one copy for each substation)	-do-
vi)	Furnishing of instruction/ operation manuals (2 copies per substation and one softcopy (pdf format) for corporate centre & per substation)	On completion of Engineering
vii)	As built drawings (two sets of hardcopy per substation & one softcopy (pdf format) for corporate centre & per substation)	On completion of entire works

NOTE :

(1) The bidder may please note that all resubmissions must incorporate all comments given in the earlier submission by the Employer or adequate justification for not incorporating the same must be submitted failing which the submission of documents is likely to be returned.

(2) Deleted.

(3) The instruction Manuals shall contain full details of drawings of all equipment being supplied under this contract, their exploded diagrams with complete instructions for storage, handling, erection, commissioning, testing, operation, trouble shooting, servicing and overhauling procedures.

(4) If after the commissioning and initial operation of the substation, the instruction manuals require any modifications/additions/changes, the same shall be incorporated and the updated final instruction manuals shall be submitted by the Contractor to the Employer.

(5) The Bidder shall furnish to the Employer catalogues of spare parts.

(6) All As-built drawings/documents shall be submitted after incorporating the changes before final submission.

5.8 Deleted.

6.0 MATERIAL/ WORKMANSHIP

6.1 General Requirement

6.1.1 Where the specification does not contain references to workmanship, equipment, materials and components of the covered equipment, it is essential 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.

6.1.2 In case where the equipment, materials or components are indicated in the specification as "similar" to any special standard, the Employer shall decide upon the question of similarity. When required by the specification or when required by the Employer the Contractor shall submit, for approval, all the information concerning the materials or components to be used in manufacture. Machinery, equipment, materials and components supplied, installed or used without such approval shall run the risk of subsequent rejection, it is to be understood that the cost as well as the time delay associated with the rejection shall be borne by the Bidder.

6.1.3 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 fulfil 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 Employer.

6.1.4 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.

6.1.5 Deleted.

6.1.6 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.

6.1.7 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. If such is the case, he shall declare source of oil/grease /other consumables in the GTP/Drawings, where such oil or grease is available. He shall help Employer in establishing equivalent Indian make and Indian Contractor. The same shall be applicable to other consumables too.

6.2 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.

6.2.1 Space Heaters

6.2.1.1 The heaters shall be suitable for continuous operation at 240V as supply voltage. On off switch and fuse shall be provided.

6.2.1.2 One or more adequately rated thermostatically connected heaters shall be supplied to prevent condensation in any compartment. The heaters shall be installed in 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.

6.2.2 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 interfere with the operation or performance of the equipment. Such surfaces or parts shall be protected against the application of the varnish.

6.2.3 Ventilation opening

Wherever ventilation is provided, the compartments shall have ventilation openings with fine wire mesh of brass to prevent the entry of insects and to reduce to a minimum the entry of dirt and dust.

6.2.4 Degree of Protection

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

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

The degree of protection shall be in accordance with IS/IEC60947; IS/IEC/60529. Type test report for of relevant Degree of Protection test, shall be submitted for approval.

6.3 RATING PLATES, NAME PLATES AND LABELS

6.3.1 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, Customer 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 Employer. The rating plate of each equipment shall be according to IS/ IEC requirement.

6.3.2 All such nameplates, instruction plates, rating plates of transformers, reactors, CB, CT, CVT, SA, Isolators, C & R panels and PLCC 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.

6.4 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 operation, shall be furnished by the Bidder unless specifically excluded under the exclusions in these specifications and documents.

7.0 DESIGN IMPROVEMENTS / COORDINATION

7.1 Deleted.

7.2 Deleted.

7.3 The Bidder shall be responsible for the selection and design of appropriate equipments to provide the best co-ordinated performance of the entire system. The basic design requirements are detailed out in this Specification. The design of various components, sub-assemblies and

assemblies shall be so done that it facilitates easy field assembly and maintenance.

7.4 The Bidder has to coordinate designs and terminations with the agencies (if any) who are Consultants/Bidder for the Employer. The names of agencies shall be intimated to the successful bidders.

7.5 The Bidder will be called upon to attend design co-ordination meetings with the Engineer, other Contractor's and the Consultants of the Employer (if any) during the period of Contract. The Bidder shall attend such meetings at his own cost at POWERGRID Corporate Centre, Gurgaon (Haryana) or at mutually agreed venue as and when required and fully cooperate with such persons and agencies involved during those discussions.

8.0 QUALITY ASSURANCE PROGRAMME

8.1 To ensure that the equipment and services under the scope of this Contract, whether manufactured or performed within the Bidder's Works or at his Sub-Bidder's premises or at the Employer's site or at any other place of Work as applicable, are in accordance with the specifications, the Contractor shall ensure suitable quality assurance programme to control such activities at all points necessary. A quality assurance programme of the Contractor shall be in line with ISO requirements & shall generally cover the following:

a) The organisation structure for the management and implementation of the proposed quality assurance programme.

b) System for Document and Data Control.

c) Qualification and Experience data of Bidder's key personnel.

d) The procedure for purchases of materials, parts, components and selection of sub-Bidder's services including vendor analysis, source inspection, incoming raw material inspection, verification of material purchases etc.

e) System for shop manufacturing and site erection controls including process controls, fabrication and assembly control.

f) System for Control of non-conforming products including deviation dispositioning, if any and system for corrective and preventive actions based on the feedback received from the Customers and also internally documented system for Customer complaints.

g) Inspection and test procedure both for manufacture and field activities.

h) System for Control of calibration of testing and measuring equipment and the indication of calibration status on the instruments.

i) System for indication and appraisal of inspection status.

j) System of Internal Quality Audits, Management review and initiation of corrective and Preventive actions based on the above.

k) System for authorising release of manufactured product to the Employer.

l) System for maintenance of records.

m) System for handling, storage and delivery.

n) A quality plan detailing out the specific quality control measures and procedure adopted for controlling the quality characteristics relevant to each item of equipment furnished and /or service rendered.

o) System for various field activities i.e. unloading, receipt at site, proper storage, erection, testing and commissioning of various equipment and maintenance of records. In this regard, the Employer has already prepared Standard Field Quality Plan for transmission line/substation equipments as applicable, Civil/erection Works which is required to be followed for associated works.

The Employer or his duly authorised representative reserves the right to carry out quality audit and quality surveillance of the system and procedure of the Bidder/his vendor's quality management and control activities.

8.2 **Quality Assurance Documents**

The Bidder shall ensure availability of the following Quality Assurance Documents:

i) All Non-Destructive Examination procedures, stress relief and weld repair procedure actually used during fabrication, and reports including radiography interpretation reports.

ii) Welder and welding operator qualification certificates.

iii) Welder's identification list, welding operator's qualification procedure and welding identification symbols.

iv) Raw Material test reports on components as specified by the specification and in the quality plan.

v) The Manufacturing Quality Plan(MQP) indicating Customer Inspection Points (CIPs) at various stages of manufacturing and methods used to verify that the inspection and testing points in the quality plan were performed satisfactorily.

vi) Factory test results for testing required as per applicable quality plan/technical specifications/GTP/Drawings etc.

vii) Stress relief time temperature charts/oil impregnation time temperature charts, wherever applicable.

8.3 INSPECTION, TESTING & INSPECTION CERTIFICATE

8.3.1 The responsibility and the basis of inspection for various items & equipment is placed at **Annexure-G** along with the requirement of MQP (Manufacturing Quality Plan), ITP(Inspection & Test Plan), FAT(Factory Acceptance Test) which should be valid & POWERGRID approved and Level of inspection envisaged against each item.

Bidder shall ensure that order for items where MQP/ITP/FAT is required will be placed only on vendors having valid MQP/ITP/FAT and where the

supplier's MQP/ITP/FAT is either not valid or has not been approved by POWERGRID, MQP shall be generally submitted as per POWERGRID format before placing order.

Items not covered under MQP/ITP/FAT shall be offered for inspection as per POWERGRID LOA/technical Specifications/POWERGRID approved data sheets/ POWERGRID approved drawings and relevant Indian/International standards.

Inspection **Levels**: For implementation of projects in a time bound manner and to avoid any delay in deputation of POWERGRID or its authorized representative, involvement of POWERGRID for inspection of various items / equipment will be based on the level below:

Level –I: Bidder to raise all inspection calls and review the report of tests carried out by the manufacturer, on his own, as per applicable standards/ POWERGRID specification, and submit to concerned POWERGRID inspection office/Inspection Engineer. CIP/MICC will be issued by POWERGRID based on review of test reports/certificates of manufacturers.

Level – II: Bidder to raise all inspection calls and carry out the inspection on behalf of POWERGRID on the proposed date of inspection as per applicable standards/specification. However, in case POWERGRID wishes to associate itself during inspection, the same would be intimated to Bidder and CIP/MICC will be issued by POWERGRID. Else, Bidder would submit their test reports/certificates to POWERGRID. CIP/MICC will be issued by POWERGRID based on review of test reports/ certificates.

Level - III: Bidder to raise inspection calls for both, stage (as applicable) & final inspection and carry out the stage inspections (if applicable) on behalf of POWERGRID on the proposed date of inspection as per applicable standards/specification. However, in case POWERGRID wishes to associate itself during stage inspection, the same would be intimated to Bidder and CIP will be issued by POWERGRID. Else, Bidder would submit the test reports / certificates of stage inspection after their own review and CIP will be issued by POWERGRID based on review of test reports / certificates. Final inspection will be carried out by POWERGRID and CIP/MICC will be issued by POWERGRID.

Level – IV: Bidder to raise inspection calls for both, stage (as applicable) & final inspections. POWERGRID will carry out the inspection for both stage & final inspection as per applicable standards/specification and CIP/MICC will be issued by POWERGRID.

8.3.2 Bidder shall ensure that to implement the above inspection levels, particularly for the quality control and inspection at sub-vendor's works, they would depute sufficient qualified & experienced manpower in their Quality Control and Inspection department. Further, to assure quality of construction, Bidder shall have a separate workforce having appropriate qualification & experience and deploy suitable tools and plant for maintaining quality requirement during construction in line with applicable Field Quality Plan (FQP).

8.3.3 The Employer, his duly authorised representative and/or outside inspection agency acting on behalf of the Employer shall have at all reasonable times access to the Bidder's premises or Works and shall have the power at all reasonable times to ensure that proper Quality Management practices / norms are adhered to, inspect and examine the materials & workmanship of the Works, to carry out Quality/Surveillance Audit during manufacture or erection and if part of the Works is being manufactured or assembled at other premises or works. The Bidder shall obtain for the Employer and for his duly authorised representative permission to inspect as if the works were manufactured or assembled on the Bidder's own premises or works. The item/equipment, if found unsatisfactory with respect to workmanship or material is liable to be rejected. The observations for improvements during product/ process inspection by POWERGRID shall be recorded in Quality Improvement Register (available & maintained at works) for review & timely compliance of observations.

8.3.4 Bidder shall submit inspection calls over internet through POWERGRID website. The required vendor code and password to enable raising inspection call will be furnished to the main Contractor within 30 days of award of contract on submission of documents by Contractor. After raising the inspection calls, Contractor shall then proceed as per the message of that particular call which is available on the message board.

8.3.5 The Employer reserves the right to witness any or all type, acceptance and routine tests specified for which the Bidder shall give the Employer/Inspector Twenty one (21) days written notice of any material being ready for testing for each stage of testing as identified in the approved quality plan as customer inspection point (CIP) for indigenous inspections. All inspection calls for overseas material shall be given at least forty five (45) days in advance. Such tests shall be to the Bidder's account except for the expenses of the Inspection Engineer. The Employer/inspector, unless witnessing of the tests is waived by Employer, will attend such tests within Twenty one (21) days of the date of which the equipment is notified as being ready for test/inspection, failing which the Bidder may proceed with the test which shall be deemed to have been made in the Inspector's presence and he shall forthwith forward to the Inspector three copies of tests, duly certified. Bidder shall ensure, before giving notice for type test, that all drawings and quality plans have been got approved. The equipment shall be dispatched to site only after approval of Routine and Acceptance test results and Issuance of Dispatch Clearance in writing by the Employer. CIP/Material Inspection clearance certificate (MICC) shall be issued by the Employer after inspection of the equipment or review of test reports as applicable. Employer may waive off the presence of Employer's inspecting engineer. In that case test will be carried out as per approved QP and test certificate will be furnished by the supplier for approval. CIP/MICC will be issued only after review and approval of the test reports.

8.3.6 Bidder shall generally offer material for inspection as per supply bar chart approved by POWERGRID and not before 30 days from schedule indicated in the bar chart. In case Bidder offers material(s) for inspection prior to 30 days from the scheduled date with necessary approval of POWERGRID, POWERGRID shall inspect the material and issue CIP only. However, in

such an exceptional case, MICC shall be issued only as per provision of original / revised approved supply schedule.

8.3.7 Bidder shall minimize the number of inspection calls by offering optimum quantities in each inspection call at the respective manufacturer's works.

8.3.8 Bidder shall inspect the material themselves and only after they are fully convinced about the Quality, they shall offer the material for POWERGRID inspection and shall also ensure that relevant portion of LOA/NOA, approved drawing and data sheets along with applicable Quality Plans are available at the works of Contractor or their Sub-vendor before the material is offered for inspection.

8.3.9 Bidder shall ensure that material which has been cleared for dispatch after inspection will be dispatched within 30 days in case of domestic supplies and within 60 days in case of Off-shore supplies from the date of issuance of CIP. Material which is not dispatched within stipulated time as above will be reoffered for POWERGRID inspection or specific approval of POWERGRID QA&I shall be obtained for delayed dispatch.

8.3.10 The Employer or IE shall give notice in writing to the Bidder, of any objection either to conformance to any drawings or to any equipment and workmanship which in his opinion is not in accordance with the Contract. The Bidder shall give due consideration to such objections and shall either make the modifications that may be necessary to meet the said objections or shall confirm in writing to the Employer/Inspection Engineer giving reasons therein, that no modifications are necessary to comply with the Contract.

8.3.11 All Test Reports and documents to be submitted in English during final inspection of equipment by POWERGRID or as and when required for submission.

8.3.12 When the factory tests have been completed at the Bidder's or Sub-Bidder's works, the Employer/Inspection Engineer(IE) shall issue a certificate to this effect within fifteen (15) days after completion of tests & submission of documents by Bidder/manufacturer but if the tests are not witnessed by the Employer/IE, the certificate shall be issued within fifteen (15) days of receipt of the Bidder's Test certificate by the Employer/IE. Bidder shall, on completion of all tests, submit test reports within Ten (10) days to POWERGRID IE. Failure of the Employer/IE to issue such a certificate shall not prevent the Contractor from proceeding with the Works. The completion of these tests or the issue of the certificate shall not bind the Employer to accept the equipment should, it, on further tests after erection, be found not to comply with the Contract.

8.3.13 In all cases, where the Contract provides for tests whether at the premises or works of the Bidder or of any Sub-Bidder, the Bidder, except where otherwise specified, shall provide free of charge such items as labour, materials, electricity, fuel, water, stores, apparatus and instruments as may be reasonably demanded by the Employer/Inspector or his authorised representative to carry out effectively such tests of the equipment in accordance with the Contract and shall give facilities to the Employer/Inspection Engineer or to his authorised representative to accomplish testing.

8.3.14 The inspection and acceptance by Employer and issue of Inspection Certificate thereon shall in no way limit the liabilities and responsibilities of the Contractor in respect of the agreed quality assurance programme forming a part of the Contract, or if such equipment is found to be defective at a later stage.

8.3.15 The Employer will have the right of having at his own expenses any other test(s) of reasonable nature carried out at Contractor's premises or at site or in any other place in addition of aforesaid type and routine tests, to satisfy that the material comply with the specification.

8.3.16 The Employer reserves the right for getting any additional field tests conducted on the completely assembled equipment at site to satisfy that material complies with specifications.

8.3.17 Rework/ Re-engineering, if any, on any item/equipment shall be carried out only after mutual discussions and in accordance with mutually agreed procedure. Bidder shall submit Joint Inspection Report of equipments under Re-Work/Re-Engineering alongwith procedure for the same to POWERGRID for approval, before taking up the Re-Work/Re-Engineering, failing which POWERGRID reserves the right to reject the equipment.

8.3.18 Bidder may establish a field test Laboratory to execute Civil Construction testing requirements at site with the condition that all testing equipment shall be calibrated from POWERGRID approved accredited Testing laboratories, with calibration certificates kept available at site and all testing personnel employed in the Field-Testing Laboratories to be qualified and experienced Engineers or testing to be carried out at POWERGRID approved Third Party Laboratories.

8.3.19 Bidder shall ensure that all possible steps are taken to avoid damages to the equipment during transport, storage and erection.

8.3.20 Deleted.

8.3.21 Bidder shall ensure commissioning of all CSDs along with Circuit Breakers wherever applicable.

8.3.22 **For EHV transformers/reactors**:

Insulation oil shall be as per POWERGRID Technical specifications and same grade shall be used for impregnation of the active part & testing at the works of Transformer/Reactor Manufacturer and as well as for filling the Transformer/Reactors at site. Contractor to ensure that windings for Transformer/Reactors are made in air-conditioned environment. Core-coil assembly shall be performed in positive pressurized dust-controlled environment. Dust measurements shall be monitored regularly at Transformer / Reactor Manufacturer works. Contractor shall ensure that respective civil foundations & Fire walls for Transformer/Reactors units to be commissioned, shall be made ready at concerned sites before receipt of Transformer/Reactors units. All the requisite material for Neutral & Delta Bus formation required for charging of complete bank of 765KV class 1-ph Transformer/Reactor units shall be made available at the concerned sites before receipt of the Transformer/Reactor units at site.

8.3.23 The Employer reserves the right to increase or decrease their involvement in inspections at Bidder's Works or at his Sub-Bidder's premises or at the

Employer's site or at any other place of Work based on performance of Bidder/sub-bidder.

9.0 TYPE TESTING & CLEARANCE CERTIFICATE

9.1 All equipment being supplied shall conform to type tests as per technical specification and shall be subject to routine tests in accordance with requirements stipulated under respective sections.

9.2 The reports for all type tests as per technical specification shall be furnished by the Contractor along with equipment / material drawings. However, type test reports of similar equipments/ material already accepted in POWERGRID shall be applicable for all projects with similar requirement. The type tests conducted earlier 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 POWERGRID/representative authorized by POWERGRID/representative of Utility /representative of accredited test lab/ representative of The National Accreditation Board for Certification Bodies (NABCB) certified agency shall also be acceptable.

Unless otherwise specified elsewhere, the type test reports submitted shall be of the tests conducted within the years specified below from the date of NOA. In case the test reports are of the test conducted earlier than the years specified below from the date of NOA, the contractor shall repeat these test(s) at no extra cost to the Employer.

S.No	Name of Equipment	Validity of type test (in years)
1	Power Transformer	5
2	LT Transformer	5
3	Shunt Reactor	5
4	OLTC	10
5	Bushing of Power Transformers/Reactors	7
6	Fittings and accessories for Power transformers & Reactors	10
7	Circuit Breaker	10
8	Isolator	10
9	Lighting Arrester	10
10	Wave Trap	10
11	Instrument transformer	7
12	GIS & Hybrid GIS	10
13	LT Switchgear	10
14	Cable and associated accessories	10
15	Relays	7
16	Capacitors	10
17	Battery & Battery Charger	7
18	Conductor & Earth wire	10
19	Insulators (Porcelain/Glass)	10
20	Composite Insulators	5
21	PLCC	5

Note :
For all other equipment's validity of type test shall be 10 years from date of NOA.

Further, 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 or any/all type tests not carried out, same shall be carried out without any additional cost implication to the Employer.

The Contractor shall intimate the Employer the detailed program about the type tests at least two (2) weeks in advance in case of domestic supplies & six (6) weeks in advance in case of foreign supplies.

9.3 The Employer intends to repeat those type tests which are indicated in the price schedule and the same shall be payable as per provision of contract. The price of conducting type tests shall be included in Bid price and break up of these shall be given in the relevant schedule of Bid Proposal Sheets. These Type test charges would be considered in bid evaluation. In case Bidder does not indicate charges for any of the type tests or does not mention the name of any test in the price schedules, it will be presumed that the particular test has been offered free of charge. Further, in case any Bidder indicates that he shall not carry out a particular test, his offer shall be considered incomplete and shall be liable to be rejected. The Employer reserves the right to waive the repeating of type tests partly or fully and in case of waival, test charges for the same shall not be payable.

9.4 The Employer reserves the right to witness any or all the type tests. The Employer shall bear all expenses for deputation of Employer's representative(s) for witnessing the type tests except in the case of re-deputation if any, necessitated due to no fault of the Employer.

9.5 The list of makes of various items, for which Type test reports are not required to be submitted are specified at Annexure-J.

10.0 Deleted.

11.0 PACKAGING & PROTECTION

11.1 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. On request of the Employer, the Bidder shall also submit packing details/associated drawing for any equipment/material under his scope of supply, to facilitate the Employer to repack any equipment/material at a later date, in case the need arises. While packing all the materials, the limitation from the point of view of availability of Railway wagon sizes in India should be taken into account. The 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 Contractor. Employer/BHEL takes no responsibility of the availability of the wagons.

11.2 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 protecting device. All ends of all valves and pipings and conduit equipment

connections shall be properly sealed with suitable devices to protect them from damage.

12.0 FINISHING OF METAL SURFACES

12.1 All metal surfaces shall be subjected to treatment for anti-corrosion protection. All ferrous surfaces for external use unless otherwise stated elsewhere in the specification or specifically agreed, shall be hot-dip galvanized after fabrication. All steel conductors including those used for earthing/grounding (above ground level) shall also be galvanized according to IS: 2629.

12.2 HOT DIP GALVANISING

12.2.1 The minimum weight of the zinc coating shall be 610 gm/sq.m and minimum average thickness of coating shall be 86 microns for all items having thickness 6mm and above. For items lower than 6mm thickness requirement of coating thickness shall be as per relevant ASTM. For surface which shall be embedded in concrete, the zinc coating shall be 610 gm/sq.m minimum.

12.2.2 The galvanized surfaces shall consist of 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.

12.2.3 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 or alternate approved treatment shall be provided to avoid formation of white rust after hot dip galvanization.

12.2.4 The galvanized steel shall be subjected to four numbers of one minute dips in copper sulphate solution as per IS-2633.

12.2.5 Sharp edges with radii less than 2.5 mm shall be able to withstand four immersions of the Standard Preece test. All other coatings shall withstand six immersions. The following galvanizing tests should essentially be performed as per relevant Indian Standards.

- Coating thickness
- Uniformity of zinc
- Adhesion test
- Mass of zinc coating

12.2.6 Galvanised material must be transported properly to ensure that galvanised surfaces are not damaged during transit. Application of touch-up zinc rich paint at site shall be allowed with approval of Engineer Incharge.

12.3 PAINTING

12.3.1 All sheet steel work shall be degreased, pickled, phosphated in accordance with the IS6005 "Code of practice for phosphating iron and sheet". All surfaces, which will not be easily accessible after shop assembly, shall beforehand be treated and protected for the life of the equipment. The surfaces, which are to be finished painted after installation or require corrosion protection until installation, shall be shop painted with at least two coats of primer. Oil, grease, dirt and swaf shall be thoroughly removed by emulsion cleaning. Rust and scale shall be removed by pickling with dilute acid followed by washing with running water, rinsing with slightly alkaline hot water and drying.

12.3.2 Hot Phosphating shall be done for phosphating process under pretreatment of sheets After phosphating, thorough rinsing shall be carried out with clean water followed by final rinsing with dilute dichromate solution and oven drying. The phosphate coating shall be sealed with application of two coats of ready mixed, stoving type zinc chromate primer. The first coat may be "flash dried" while the second coat shall be stoved.

12.3.3 After application of the primer, two coats of finishing synthetic enamel paint shall be applied, each coat followed by stoving. The second finishing coat shall be applied after inspection of first coat of painting.

12.3.4 The exterior and interior colour of the paint in case of new substations shall preferably be RAL 7032 for all equipment, marshalling boxes, junction boxes, control cabinets, panels etc. unless specifically mentioned under respective sections of the equipments. Glossy white colour inside the equipments /boards /panels/junction boxes is also acceptable. The exterior colour for panels shall be matching with the existing panels in case of extension of a substation. Each coat of primer and finishing paint shall be of slightly different shade to enable inspection of the painting. A small quantity of finishing paint shall be supplied for minor touching up required at site after installation of the equipments.

12.3.5 In case the contractor proposes to follow his own standard surface finish and protection procedures or any other established painting procedures, like electrostatic painting etc., the procedure shall be submitted during detailed engineering for Employer's review & approval.

12.3.6 The colour scheme as given below shall be followed for Fire Protection and Air Conditioning systems

S.No.	PIPE LINE	Base colour	Band colour
Fire Protection System			
1	Hydrant and Emulsifier system pipeline/NIFPS	FIRE RED	-
2	Emulsifier system detection line – water	FIRE RED	Sea Green
3	Emulsifier system detection line –Air	FIRE RED	Sky Blue
4	Pylon support pipes	FIRE RED	

Air Conditioning Plant			
5	Refrigerant gas pipeline – at compressor suction	Canary Yellow	-
6	Refrigerant gas pipeline – at compressor discharge	Canary Yellow	Red
7	Refrigerant liquid pipeline	Dark Admiralty Green	-
8	Chilled water pipeline	Sea Green	-
9	Condenser water pipeline	Sea Green	Dark Blue

The direction of flow shall be marked by → (arrow) in black colour.



Base Colour Direction of flow Band Colour

12.3.7 For aluminium casted surfaces, the surface shall be with smooth finish. Further, in case of aluminium enclosures, the surface shall be coated with powder (coating thickness of 60 microns) after surface preparation for painting. For stainless steel surfaces, no painting is envisaged.

12.3.8 Band colour is required for Emulsifier system detection line only if both water and air detection lines are present at the same substation. Further, band colour shall be applied at an interval of 2 meters approx. along the length and minimum width of band shall be 25mm.

13.0 Deleted.

14.0 TOOLS

14.1 Deleted.

14.2 SPECIAL TOOLS AND TACKLES

The bidder shall supply all special tools and tackles required for Operation and maintenance of equipment. The special tools and tackles shall only cover items which are specifically required for the equipment offered and are proprietary in nature. The list of special tools and tackles, if any, shall be finalized during detail engineering and the same shall be supplied without any additional cost implication to the Employer.

14.3 Deleted.

15.0 AUXILIARY SUPPLY

15.1 The auxiliary power for station supply, including the equipment drive, cooling system of any equipment, air-conditioning, lighting etc shall be designed for the specified Parameters as under. The DC supply for the instrumentation and PLCC system shall also conform the parameters as indicated in the following table:

Normal Voltage	Variation in Voltage	Frequency in HZ	Phase/Wire	Neutral connection
415V	± 10%	50 ± 5%	3/4 Wire	Solidly Earthed.

240V	± 10%	50 ± 5%	1/2 Wire	Solidly Earthed.
220V	190V to 240V	DC	Isolated 2 wire System	-
110V	95V to 120V	DC	Isolated 2 wire System	-
48V	--	DC	2 wire system (+) earthed	-

Combined variation of voltage and frequency shall be limited to ± 10%.

15.2 Pickup value of binary input modules of Intelligent Electronic Devices, Digital protection couplers, Analog protection couplers shall not be less than 50% of the specified rated station auxiliary DC supply voltage level.

16.0 SUPPORT STRUCTURE (ONLY OF CIRCUIT BREAKER)

16.1 The equipment support structures shall be suitable for equipment connections at the first level i.e 14.0-meter, 8.0-meter, 5.9 meter and 4.6 meter from plinth level for 765kV, 400kV, 220kV and 132kV substations respectively. All equipment support structures shall be supplied alongwith brackets, angles, stools etc. for attaching the operating mechanism, control cabinets & marshalling box (wherever applicable) etc.

16.2 The minimum vertical distance from the bottom of the lowest porcelain/polymer part of the bushing, porcelain/polymer enclosures or supporting insulators to the bottom of the equipment base, where it rests on the foundation pad shall be 2.55 metres.

17.0 CLAMPS AND CONNECTORS INCLUDING TERMINAL CONNECTORS (For Lightning Arrester & Wave Trap only)

17.1 All power clamps and connectors shall conform to IS:5561 or other equivalent international standard and shall be made of materials listed below :

Sl. No.	Description	Materials
a)	For connecting ACSR conductors/AAC conductors/ Aluminium tube	Aluminum alloy casting, conforming to designation **4600** of IS:617 and all test shall conform to IS:617
b)	For connecting equipment terminals mad of copper with ACSR conductors/AAC conductors/ Aluminium tube	Bimetallic connectors made from aluminum alloy casting, conforming to designation **4600** of IS:617 with 2mm thick bimetallic liner/strip and all test shall conform to IS:617
c)	For connecting G.I	Galvanised mild steel shield wire

d)	Bolts, nuts & plain washers	Electro-galvanised for sizes below M12, for others hot dip galvanised.
e)	Spring washers	Electro-galvanised mild steel suitable for atleast service condition-3 as per IS:1573

17.2 Necessary clamps and connectors shall be supplied for all equipment and connections. If corona rings are required to meet these requirements they shall be considered as part of that equipment and included in the scope of work.

17.3 Where copper to aluminum connections are required, bi-metallic 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 parts which are not current carrying or subjected to stress.

17.4 Low voltage connectors, grounding connectors and accessories for grounding all equipment as specified in each particular case, are also included in the scope of Work.

17.5 No current carrying part of any clamp shall be less than 10 mm thick. All ferrous parts shall be hot dip galvanised. Copper alloy liner/strip of minimum 2 mm thickness shall be cast integral with aluminum body or 2 mm thick bi-metallic liner/strips shall be provided for Bi-metallic clamps.

17.6 All casting shall be free from blow holes, surface blisters, cracks and cavities. All sharp edges and corners shall be blurred and rounded off.

17.7 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 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.

17.8 Current carrying parts (500A and above) of the clamp/connector shall be provided with minimum four numbers of bolts preferably for 132kV and above.

17.9 All current carrying parts shall be designed and manufactured to have minimum contact resistance.

17.10 Power Clamps and connectors shall be designed to control corona as per requirement.

17.11 Tests

Clamps and connectors should be type tested on minimum three samples as per

IS:5561 and shall also be subjected to routine tests as per IS:5561. Following type test reports shall be submitted for approval. Type test once conducted shall hold good. The requirement of test conducted within last ten years, shall not be applicable.

i) Temperature rise test (maximum temperature rise allowed is 35°C over 50°C ambient)

ii) Short time current test

iii) Corona (dry) and RIV (dry) test [for 132kV and above voltage level clamps]

iv) Resistance test and Pullout strength test

v) Cantilever Strength test on bus support clamps & connectors

18.0 **CONTROL CABINETS, JUNCTION BOXES, TERMINAL BOXES MARSHALLING BOXES FOR OUTDOOR EQUIPMENT**

18.1 All types of boxes, cabinets etc. shall generally conform to & be tested in accordance with IS/IEC 61439-0, as applicable, and the clauses given below:

18.2 Control cabinets, junction boxes, Marshalling boxes & terminal boxes, Out door ACDB cum DCDB panels shall be made of stainless steel of atleast 1.5 mm thick or aluminium enclosure of atleast 1.6 mm thick and shall be dust, water and vermin proof. Stainless steel used shall be of grade SS304 (SS316 for coastal area) or better. 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.

Control cabinets, junction boxes, marshalling boxes & terminal boxes, out-door ACDB cum DCDB panels shall have adequate space/clearance as per guidelines/technical specifications to access/replace any component. Necessary component labelling to be also done on non-conducting sheet.

For CONTROL CABINETS, JUNCTION BOXES, TERMINAL BOXES MARSHALLING BOXES

FOR OUTDOOR EQUIPMENT Junction Box, wire should be as per IS or equivalent IEC with FRLS grade.

Machine laid PU Foam gasket may be permitted for use in Control Cabinets etc.

18.3 A canopy and sealing arrangements for operating rods shall be provided in marshalling boxes / Control cabinets to prevent ingress of rain water.

18.4 Cabinet/boxes with width more than 700 mm 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.

18.5 All doors, removable covers and plates shall be gasketed all around with suitably profiled EPDM/Neoprene/PU gaskets. The gasket shall be tested in accordance with approved quality plan, IS:11149 and IS:3400. Ventilating Louvers, if provided, shall have screen and filters. The screen shall be fine wire mesh made of brass.

Further, the gasketing arrangement shall be such that gaskets are pasted in slots (in door fabrication/gasket itself) in order to prevent ingression of dust and moisture inside the panels so that no internal rusting occurs in panels during the operation of the equipment.

18.6 All boxes/cabinets shall be designed for the entry of cables 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 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. The Nickel plated glands shall be dust proof, screw on & double compression type and made of brass. The gland shall have provision for securing armour of the cable separately and shall be provided with earthing tag. The glands shall conform to BS:6121.

18.7 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.

18.8 LED based illumination of minimum 9 watts 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.

18.9 All control switches shall be of MCB/rotary switch type and Toggle/piano switches shall not be accepted.

18.10 Earthing of the cabinet shall be ensured by providing two separate earthing pads. The earth wire 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.

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

18.12 The following routine tests alongwith the routine tests as per IS:5039 shall also be conducted:

i) Check for wiring
ii) Visual and dimension check

18.13 The enclosure of bay marshalling kiosk, junction box, terminal box and control cabinets shall conform to IP-55 as per IS/IEC60947 including application of 1kV rms for 1 (one) minute, after IP-55 test.

19.0 Deleted.

20.0 TERMINAL BLOCKS AND WIRING

20.1 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.

20.2 Terminal blocks shall be 650V grade and have continuous rating to carry the maximum expected current on the terminals and non-breakable type.

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 the terminal blocks shall be non-disconnecting stud type except for the secondary junction boxes of Current Transformer and Voltage Transformer.

20.3 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.

20.4 The terminal 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.

20.5 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.

20.6 The terminal blocks shall be of extensible design, multilayer terminal arrangement is not allowed in any junction box (Common MB, Individual MB, JB etc.). There should be sufficient space at both sides of terminals so that ferrule number of wires / TB numbers are clearly visible during wire removal or insertion.

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

20.8 The terminal blocks shall be fully enclosed with removable covers of transparent, nondeteriorating 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.

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

a) All circuits except CT/PT circuits	Minimum of two of 2.5 sq mm copper flexible.
b) All CT/PT circuits	Minimum of 4 nos. of 2.5 sq mm copper flexible.

20.10 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.

20.11 Atleast 20 % spare terminals shall be provided on each panel/cubicle/box and these spare terminals shall be uniformly distributed on all terminals rows.

20.12 There shall be a minimum clearance of 250 mm between the First/bottom row of terminal block and the associated cable gland plate for outdoor

ground mounted marshalling box and the clearance between two rows of terminal blocks shall be a minimum of 150 mm.

20.13 The Contractor 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

21.0 LAMPS & SOCKETS

21.1 **Lamps & Sockets**

All lamps shall use a socket base as per IS-1258, except in the case of signal lamps.

All sockets (convenience outlets) shall be suitable to accept both 5 Amp & 15 Amp pin round Standard Indian plugs. They shall be switched sockets with shutters.

21.2 **Hand Lamp:**

A 240 Volts, single Phase, 50 Hz AC plug point shall be provided in the interior of each cubicle with ON-OFF Switch for connection of hand lamps.

21.3 **Switches and Fuses:**

21.3.1 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 / switch fuse 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.

21.3.2 All fuses shall be of HRC cartridge type conforming to relevant IS 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 of the fuse rating and voltage.

22.0 **BUSHINGS, HOLLOW COLUMN INSULATORS, SUPPORT INSULATORS**:

22.1 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-60168 and IEC-60273. The insulators shall also conform to IEC-60815 as applicable.

The bidder may also offer composite hollow insulators, conforming to IEC-61462.

22.2 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.

22.3 Glazing of the porcelain shall be uniform brown in colour, free from blisters, burrs and similar other defects.

22.4 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.

22.5 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.

22.6 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.

22.7 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.

22.8 Void

22.9 Deleted.

23.0 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.

23.1 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.

23.2 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 having the particulars as given in Clause 15.0 of this Section.

23.3 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 under Clause 15.0 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.

23.4 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.

23.5 TESTING AND COMMISSIONING

An indicative list of tests is given below. Contractor shall perform any additional test based on specialities of the items as per the field Q.P./Instructions of the equipment Contractor or Employer without any extra cost to the Employer. The Contractor shall arrange all instruments

required for conducting these tests alongwith calibration certificates and shall furnish the list of instruments to the Employer for approval.

(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

ANNEXURE-A

CORONA AND RADIO INTERFERENCE VOLTAGE (RIV) TEST

1. General

Unless otherwise stipulated, all equipment together with its associated connectors, where applicable, shall be tested for external corona (for 400kV & 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 132kV and above.

2. 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. 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 carried out in accordance with relevant IEC of respective equipment or NEMA standard Publication No. 107-1964.

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 765kV, 400 kV, 220 KV 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. 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 3 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 three values at which visible corona (negative or positive polarity) disappears.

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

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 Employer's inspector if, in his opinion, it will not prejudice other test

5. 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.

SEISMIC WITHSTAND TEST PROCEDURE

The seismic withstanding test on the complete equipment (for 400kV and above) shall be carried out along with supporting structure. Seismic Withstand Test carried out using either lattice or pipe structure is acceptable." **Seismic Calculations certified by NABL Labs shall also be acceptable**

The Bidder shall arrange to transport the structure from his Contractor's premises/ POWERGRID 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 Employer. 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 Employer.

The frequency range for the earthquake spectra shall be as per IEC–62271-300.

ANNEXURE-C

LIST OF GENERAL STANDARDS AND CODES

CODES	TITLE
--	India Electricity Rules
--	Indian Electricity Act
--	Indian Electricity (Supply) Act
--	Indian Factories Act
IS-5	Colors for Ready Mixed Paints and Enamels
IS-335	New Insulating Oils
IS-617	Aluminium and Aluminium Alloy Ingots and Castings for General Engineering Purposes
IS-1448 (P1 to P 145)	Methods of Test for Petroleum and its Products
IS-2071 (P1 to P3)	Methods of High Voltage Testing
IS-12063	Classification of degrees of protection provided by enclosures of electrical equipment
IS-2165 ; P1:1997, P2:1983	Insulation Coordination
IS-3043	Code of Practice for Earthing
IS-6103	Method of Test for Specific Resistance (Resistivity) of Electrical Insulating Liquids
IS-6104	Method of Test for Interfacial Tension of Oil against Water by the Ring Method
IS-6262	Method of test for Power factor & Dielectric Constant of Electrical Insulating Liquids
IS-6792	Method for determination of electric strength of insulating oils
IS-5578	Guide for marking of insulated conductors
IS-11353	Guide for uniform system of marking & identification of conductors & apparatus terminals.
IS-8263	Methods for Radio Interference Test on High voltage Insulators
IS-9224 (Part 1,2&4)	Low Voltage Fuses
IEC-60060 (Part 1 to P4)	High Voltage Test Techniques
IEC 60068	Environmental Test
IEC-60117	Graphical Symbols
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 Hexafloride
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 & Control gear Standards
IEC-60815	Guide for the Selection of Insulators in respect of Polluted Conditions

CODES	TITLE
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, C63.3	Specification for Electromagnetic Noise and Field Strength Instrumentation 10 KHz to 1 GHZ
C36.4ANSI-C68.1	Techniquest for Dielectric Tests
ANSI-C76.1/EEE21	Standard General Requirements and Test Procedure for Outdoor Apparatus Bushings
ANSI-SI-4	Specification for Sound Level Meters
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
CSA-Z299.4-1979h	Inspection 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

CODES	TITLE
ANSI-CG,1EEE-4	Standard Techniques for High Voltage Testing
IEC 60076	Power transformers
IEC 60076-1	Part 1: General
IEC 60076-2	Part 2: Temperature rise
IEC 60076-3	Part 3: Insulation levels, dielectric tests and external clearances in air
IEC 60076-4	Part 4: Guide to the lightning impulse and switching impulse testing - Power transformers and reactors
IEC 60076-3-1	Part 3-1: Insulation Levels and Dielectric Tests –External Clearances in Air
IEC 60076-5	Part 5: Ability to withstand short circuit
IEC 60076-6	Part 6: Reactors
IEC 60076-7	Part 7: Loading guide for oil-immersed power transformers
IEC 60076-8	Part 8: Application guide
IEC 60076-10	Part 10: Determination of sound levels
IEC 60076-10-1	Part 10-1: Determination of sound levels - Application guide
IEC 60076-11	Part 11: Dry-type transformers
IEC 60076-12	Part 12: Loading guide for dry-type power transformers
IEC 60076-13	Part 13: Self-protected liquid-filled transformers
IEC 60076-14	Part 14: Design and application of liquid-immersed power transformers using high-temperature insulation materials
IEC 60076-15	Part 15: Gas-filled power transformers
IEC 60076-16	Part 16: Transformers for wind turbine applications
IEC 60076-18	Part 18: Measurement of frequency response
IEC 60076-19	Part 19: Rules for the determination of uncertainties in the measurement of losses in power transformers and reactors
IEC 60076-21	Part 21: Standard requirements, terminology, and test code for step-voltage regulators
IEC 60044, BS 3938	Current transformers
IEC 60050	International Electrotechnical Vocabulary
IEC 60050(421)	International Electrotechnical vocabulary- Chapter 421 : Power Transformers and Reactors
IEC 60060	High Voltage test techniques
IEC 60060-1	General definitions and test requirements
IEC 60060-2	Measuring systems
IEC 60071	Insulation co-ordination
IEC 60071-1	Part 1: Definitions, principles and rules
IEC 60071-2	Part 2 : Application guide
IEC 60137	Bushing for alternating voltage above 1000V
IEC 60214	On-Load Tap changers
IEC 255-21-3	Relays vibration

CODES	TITLE
IEC 60270	Partial discharge measurements
IEC 60296	Specification for Unused Mineral Oil for Transformers and Switchgear
IEC 60422	Supervision and Maintenance guide for Mineral Insulating Oil in Electrical Equipment
IEC 60475	Method of Sampling Liquid dielectrics
IEC 60529	Classification of Degrees of Protection provided by Enclosures
IEC 60542	Application Guide for On-Load Tap-Changers
IEC 60567	Guide for the Sampling of Gases and of Oil from Oil-filled Electrical Equipment for the Analysis of Free and Dissolved Gases
IEC 60651	Sound Level Meters
IEC 61083	Digital Recorders and Software for High Voltage Impulse testing
IEC 61083-1	Part 1: Requirements for digital recorders in high voltage impulse tests
IEC 61083-2	Part 2: Evaluation of software used for the determination of the parameters of impulse waveforms
CISPR 16	Specification for radio disturbance and immunity measuring apparatus
CISPR 16-1	Radio disturbance and immunity measuring apparatus
CISPR-18	Radio Interference Characteristics of Power Lines and High Voltage Equipment
ISO 9001	Quality system-Model for Quality Assurance in Design /development
Cigre Publication 202	Guidelines for conducting design reviews for transformers 100 MVA and 123 kV and above. August 2002-Cigre Working Group 12.22
WG 12-15	Guide for Customers Specifications for Transformers 100 MVA and 123 kV and above
WG 12 19	Short Circuit Performance of Transformers.
BS-4360	Specification for weldable structural steel
BS-5135	Specification for arc welding of carbon and carbon manganese steels
BS-5500	Specification for unfired fusion welded pressure vessels
IS-3618	Specification for phosphate treatment of iron & steel for protection against corrosion
IS-6005	Code of practice for phosphating of Iron and Steel
ISO-8501	Preparation of steel surface before application of Paints and related product
IEC-60599	Mineral oil impregnated electrical equipment in service – guide to the interpretation of dissolved and free gases analysis
IS-10593	Method of evaluating the analysis of gases in oil filled electrical equipment in service
IS-2099	Bushings for alternating voltages above 1000 volts

CODES	TITLE
IS-3347 Part I to 8	Dimension for porcelain transformer bushing
DIN-42530	Bushing up to 1000kV from 250A-5000A for liquid filled Transformer
IS-2026 Part 1 to 5	Power transformer
IS-4691	Degrees of protection provided by enclosure for rotating electrical machinery
IEC-60034-5	Degrees of protection provided by integral design of rotating electrical machines(IP Code) classification
IS:325 / IEC -60034	Performance of cooling fan / oil pump motor
IS-13947 part 1 to 5	Specification for low voltage switchgear and control gear
IS:3400	Methods of test for vulcanised rubber
IS:7016 part 1 to 14	Methods of test for coated and treated fabrics
IS:803	Code of practice for design, fabrication and erection of vertical mild steel cylindrical welded oil storage tanks.
IS:3637	Gas operated Relays
IS:335	New Insulating oils – Specification
IEC-62271-203	Gas insulated metal enclosed switchgear for rated voltage above 52kV
IEC-61639	Direct connection between power transformers and gas-insulated metal enclosed switchgear for rated voltages of 52.5 kV and above.
IS:3400 / BS 903 / IS:7016	Air cell (Flexible Air Separator)
IEC 60529 / IP : 55	Degree of protection for cooler control cabinet , MOLG, Cooling fan , oil pump, Buchholz Relay
IEC 60529 / IP : 56	Degree of protection for Pressure Relief Device
IEC 60529 / IP : 43	Degree of protection for Remote tap Changer cubicle (RTCC)
CIRCUIT BREAKERS	
IEC-62271-100	High-voltage switchgear and control gear - Part 100: Alternating current circuit-breakers
IEC-62271-101	High-voltage switchgear and control gear - Part 101: Synthetic testing
IEC-62155	Hollow pressurized and unpressurized ceramic and glass insulators for use in electrical equipment with rated voltages greater than 1000 V
IEC-62271-110	High-voltage switchgear and control gear - Part 110: Inductive load switching
IEC-62271-109	High-voltage switchgear and control gear - Part 110: Inductive load switching
CURRENT TRANSFORMERS, VOLTAGE TRANSFORMERS AND COUPLING CAPACITOR VOLTAGE TRANSFORMERS	
IS-2705- (P1 to P4)	Current Transformers

CODES	TITLE
IS:3156- (P1 to P4)	Voltage Transformers
IS-4379	Identification of the Contents of Industrial Gas Cylinders
IEC-61869 (Part-1)	Instrument transformers - Part 1: General requirements
IEC-61869 (Part-2)	Instrument transformers - Part 2: Additional requirements for current transformers
IEC-61869 (Part-3)	Instrument transformers - Part 3: Additional requirements for inductive voltage transformers
IEC-61869 (Part-4)	Instrument transformers - Part 4: Additional requirements for combined transformers
IEC-61869 (Part-5)	Instrument transformers - Part 5: Additional requirements for capacitor voltage transformers
IEC-61869 (Part-6)	Instrument transformers - Part 6: Additional general requirements for low-power instrument transformers
IEC-61869 (Part-9)	Instrument transformers - Part 9: Digital interface for instrument transformers
IEC-61869 (Part-102)	Instrument transformers - Part 102: Ferroresonance oscillations in substations with inductive voltage transformers
IEC-61869 (Part-103)	Instrument transformers - The use of instrument transformers for power quality measurement
BUSHING	
IS-2099	Bushings for Alternating Voltages above 1000V
IEC-60137	Insulated Bushings for Alternating Voltages above 1000V
SURGE ARRESTERS	
IS-3070 (PART2)	Lightning arresters for alternating current systems : Metal oxide lightning arrestors without gaps
IEC-60099-4	Metal oxide surge arrestors without gaps
IEC-60099-5	Selection and application recommendation
ANSI-C62.1	IEE Standards for S A for AC Power Circuits
NEMA-LA 1	Surge Arresters
CUBICLES AND PANELS & OTHER RELATED EQUIPMENTS	
IS-722, IS-1248	Electrical relays for power system
IS-3231, 3231 (P-3)	Protection
IS:5039	Distributed pillars for Voltages not Exceeding 1000 Volts
IEC-60068.2.2	Basic environmental testing procedures Part 2: Test B: Dry heat
IEC-60529	Degree of Protection provided by enclosures
IEC-60947-4-1	Low voltage switchgear and control gear
IEC-61095	Electromechanical Contactors for household and similar purposes
IEC-60439 (P1 & 2)	Low Voltage Switchgear and control gear assemblies
ANSI-C37.20	Switchgear Assemblies, including metal enclosed bus
ANSI-C37.50	Test Procedures for Low Voltage Alternating Current Power

CODES	TITLE
	Circuit Breakers
ANSI-C39	Electric Measuring instrument
ANSI-C83	Components for Electric Equipment
IS: 8623: (Part I to 3)	Specification for Switchgear & Control Assemblies
NEMA-AB	Moulded Case Circuit and Systems
NEMA-CS	Industrial Controls and Systems
NEMA-PB-1	Panel Boards
NEMA-SG-5	Low voltage Power Circuit breakers
NEMA-SG-3	Power Switchgear Assemblies
NEMA-SG-6	Power switching Equipment
NEMA-5E-3	Motor Control Centers
1248 (P1 to P9)	Direct acting indicating analogue electrical measuring instruments & their accessories
Disconnecting switches	
IEC-62271-102	High-voltage switchgear and control gear - Part 102: Alternating current disconnectors and earthing switches
IEC-60265 (Part 1 & 2)	High Voltage switches
ANSI-C37.32	Schedule of preferred Ratings, Manufacturing Specifications and Application Guide for high voltage Air Switches, Bus supports and switch accessories
ANSI-C37.34	Test Code for high voltage air switches
NEMA-SG6	Power switching equipment
PLCC and line traps	
IS-8792	Line traps for AC power system
IS-8793	Methods of tests for line traps
IS-8997	Coupling devices for PLC systems
IS-8998	Methods of test for coupling devices for PLC systems
IEC-60353	Line traps for A.C. power systems
IEC-60481	Coupling Devices for power line carrier systems
IEC-60495	Single sideboard power line carrier terminals
IEC-60683	Planning of (single Side-Band) power line carrier systems
CIGRE	Teleprotection report by Committee 34 & 35
CIGRE	Guide on power line carrier 1979
CCIR	International Radio Consultative Committee
CCITT	International Telegraph & Telephone Consultative Committee
EIA	Electric Industries Association
Protection and control equipment	
IEC-60051: (P1 to P9)	Recommendations for Direct Acting indicating analogue electrical measuring instruments and their accessories
IEC-60255 (Part 1 to 23)	Electrical relays
IEC-60297 (P1 to P4)	Dimensions of mechanical structures of the 482.6mm (19 inches)

CODES	TITLE
	series
IEC-60359	Expression of the performance of electrical & electronic measuring equipment
IEC-60387	Symbols for Alternating-Current Electricity meters
IEC-60447	Man machine interface (MMI) - Actuating principles
IEC-60521	Class 0.5, 1 and 2 alternating current watt hour metres
IEC-60547	Modular plug-in Unit and standard 19-inch rack mounting unit based on NIM Standard (for electronic nuclear instruments)
ANSI-81	Screw threads
ANSI-B18	Bolts and Nuts
ANSI-C37.1	Relays, Station Controls etc
ANSI-C37.2	Manual and automatic station control, supervisory and associated telemetering equipment
ANSI-C37.2	Relays and relay systems associated with electric power apparatus
ANSI-C39.1	Requirements for electrical analog indicating instruments
MOTORS	
IS-325	Three phase induction motors
IS-4691	Degree of protection provided by enclosure for rotating electrical machinery
IEC-60034 (P1 to P19:)	Rotating electrical machines
IEC-Document 2	Three phase induction motors
(Central Office) NEMA-MGI	Motors and Generators
Electronic equipment and components	
MIL-21B, MIL-833 & MIL-2750	Environmental testing
EC-60068 (P1 to P5)	Printed boards
IEC-60326 (P1 to P2)	Material and workmanship standards
IS-1363 (P1 to P3)	Hexagon head bolts, screws and nuts of product grade C
IS-1364 (P1 to P5)	Hexagon head bolts, screws and nuts of products grades A and B
IS-3138	Hexagonal Bolts and Nuts (M42 to M150)
ISO-898	Fasteners: Bolts, screws and studs
ASTM	Specification and tests for materials
Clamps & connectors	
IS-5561	Electric power connectors
NEMA-CC1	Electric Power connectors for sub station
NEMA-CC 3	Connectors for Use between aluminium or aluminum-Copper Overhead Conductors
Bus hardware and insulators	
IS: 2121	Fittings for Aluminum and steel cored Al conductors for overhead

CODES	TITLE
	power lines
IS-731	Porcelain insulators for overhead power lines with a nominal voltage greater than 1000 V
IS-2486 (P1 to P4)	Insulator fittings for overhead power lines with a nominal voltage greater than 1000 V
IEC-60120	Dimensions of Ball and Socket Couplings of string insulator units
IEC-60137	Insulated bushings for alternating voltages above 1000 V
IEC-60168	Tests on indoor and outdoor post insulators of ceramic material or glass for Systems with Nominal Voltages Greater than 1000 V
IEC-62155	Hollow pressurized and unpressurized ceramic and glass insulators for use in electrical equipment with rated voltages greater than 1 000 V
IEC-60273	Characteristics of indoor and outdoor post insulators for systems with nominal voltages greater than 1000V
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
IEC-60305	Insulators for overhead lines with nominal voltage above 1000V-ceramic or glass insulator units for ac systems Characteristics of String Insulator Units of the cap and pin type
IEC-60372 (1984)	Locking devices for ball and socket couplings of string insulator units : dimensions and tests
IEC-60383 (P1 and P2)	Insulators for overhead lines with a nominal voltage above 1000 V
IEC-60433	Characteristics of string insulator units of the long rod type
IEC-60471	Dimensions of Clevis and tongue couplings of string insulator units
ANSI-C29	Wet process porcelain insulators
ANSI-C29.1	Test methods for electrical power insulators
ANSI-C92.2	For insulators, wet-process porcelain and toughened glass suspension type
ANSI-C29.8	For wet-process porcelain insulators apparatus, post-type
ANSI-G.8	Iron and steel hardware
CISPR-7B	Recommendations of the CISPR, tolerances of form and of Position, Part 1
ASTM A-153	Zinc Coating (Hot-Dip) on iron and steel hardware
Strain and rigid bus-conductor	
IS-2678	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
ASTM-B 230-82	Aluminum 1350 H19 Wire for electrical purposes

CODES	TITLE
ASTM-B 231-81	Concentric - lay - stranded, aluminum 1350 conductors
ASTM-B 221	Aluminum - Alloy extruded bar, road, wire, shape
ASTM-B 236-83	Aluminum bars for electrical purpose (Bus-bars)
ASTM-B 317-83	Aluminum-Alloy extruded bar, rod, pipe and structural shapes for electrical purposes (Bus Conductors)
Batteries	
IS:1651	Stationary Cells and Batteries, Lead-Acid Type (with Tubular Positive Plates)
IS:1652	Stationary Cells and Batteries, Lead-Acid Type (with Plante Positive Plates)
IS:1146	Rubber and Plastic Containers for Lead-Acid Storage Batteries
IS:6071	Synthetic Separators for Lead-Acid Batteries
IS:266	Specification for Sulphuric Acid
IS:1069	Specification for Water for Storage Batteries
IS:3116	Specification for Sealing Compound for Lead-Acid Batteries
IS:1248	Indicating Instruments
IS:10918	Vented type nickel Cadmium Batteries
IEC:60896-21&22	Lead Acid Batteries Valve Regulated types – Methods of Tests & Requirements
IEC: 60623	Vented type nickel Cadmium Batteries
IEC:60622	Secondary Cells & Batteries – Sealed Ni-Cd rechargeable single cell
IEC:60623	Secondary Cells & Batteries – Vented Ni-Cd rechargeable single cell
IEC:60896-11	Stationary Lead Acid Batteries – Vented Type – General requirements & method of tests
IEEE-485	Recommended practices for sizing of Lead Acid Batteries
IEEE-1115	Sizing of Ni-Cd Batteries
IEEE-1187	Recommended practices for design & installation of VRLA Batteries
IEEE-1188	Recommended practices for design & installation of VRLA Batteries
IEEE-1189	Guide for selection of VRLA Batteries
Battery Charger	
IS:3895	Mono-crystalline Semiconductor Rectifier Cells and Stacks
IS:4540	Mono-crystalline Semiconductor Rectifier Assemblies and Equipment
IS:6619	Safety Code for Semiconductor Rectifier Equipment
IS:2026	Power Transformers

CODES	TITLE
IS:2959	AC Contactors for Voltages not Exceeding 1000 Volts
IS:1248	Indicating Instruments
IS:2208	HRC Fuses
IS:13947 (Part-3)	Air break switches, air break disconnectors & fuse combination units for voltage not exceeding 1000V AC or 1200V DC
IS:2147	Degree of protection provided by enclosures for low voltage switchgear and control gear
IS:6005	Code of practice for phosphating of Iron and Steel
IS:3231	Electrical relays for power system protection
IS:3842	Electrical relay for AC Systems
IS:5	Colours for ready mix paint
IEEE-484	Recommended Design for installation design and installation of large lead storage batteries for generating stations and substations
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)
IS-694	PVC insulated cables for working voltages upto and including 1100 Volts
IS-1255	Code of practice for installation and maintenance of power cables, upto and including 33 kV rating
IS-1554 (P1 and P2)	PVC insulated (heavy duty) electric cables (part 1) for working voltage upto and including 1100 V Part (2) for working voltage from 3.3 kV upto and including 11kV
IS:1753	Aluminium conductor for insulated cables
IS:2982	Copper Conductor in insulated cables
IS-3961 (P1 to P5)	Recommended current ratings for cables
IS-3975	Mild steel wires, formed wires and tapes for armouring of cables
IS-5831	PVC insulating and sheath of electric cables
IS-6380	Elastometric insulating and sheath of electric cables
IS-7098	Cross linked polyethylene insulated PVC sheathed cables for working voltage upto and including 1100 volts
IS-7098	Cross-linked polyethyle insulated PVC sheathed cables for working voltage from 3.3kV upto and including 33 kV
IS-8130	Conductors for insulated electrical cables and flexible cords
IS-1753	Aluminum Conductors for insulated cables
IS-10418	Specification for drums for electric cables
IEC-60096 (part 0 to p4)	Radio Frequency cables
IEC-60183	Guide to the Selection of High Voltage Cables

CODES	TITLE
IEC-60189 (P1 to P7)	Low frequency cables and wires with PVC insulation and PVC sheath
IEC-60227 (P1 to P7)	Polyvinyl Chloride insulated cables of rated voltages up to and including 450/750V
IEC-60228	Conductors of insulated cables
IEC-60230	Impulse tests on cables and their accessories
IEC-60287 (P1 to P3)	Calculation of the continuous current rating of cables (100% load factor)
IEC-60304	Standard colours for insulation for low-frequency cables and wires
IEC-60331	Fire resisting characteristics of Electric cables
IEC-60332 (P1 to P3)	Tests on electric cables under fire conditions
IEC-60502	Extruded solid dielectric insulated power cables for rated voltages from 1 kV upto to 30 kV
IEC-754 (P1 and P2)	Tests on gases evolved during combustion of electric cables
AIR conditioning and ventilation	
IS-659	Safety code for air conditioning
IS-660	Safety code for Mechanical Refrigeration
ARI:520	Standard for Positive Displacement Refrigeration Compressor and Condensing Units
IS:4503	Shell and tube type heat exchanger
ASHRAE-24	Method of testing for rating of liquid coolers
ANSI-B-31.5	Refrigeration Piping
IS:2062	Steel for general structural purposes
IS:655	Specification for Metal Air Dust
IS:277	Specification for Galvanised Steel Sheets
IS-737	Specification for Wrought Aluminium and Aluminium Sheet & Strip
IS-1079	Hot rolled cast steel sheet & strip
IS-3588	Specification for Electrical Axial Flow Fans
IS-2312	Propeller Type AC Ventilation Fans
BS-848	Methods of Performance Test for Fans
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-STD-282	DOP smoke penetration method
ASHRAE-52	Air cleaning device used in general ventilation for removing particle matter
IS:3069	Glossary of Terms, Symbols and Units Relating to Thermal Insulation Materials

CODES	TITLE
IS:4671	Expanded Polystyrene for Thermal Insulation Purposes
IS:8183	Bonded Mineral Wool
IS:3346	Evaluation of Thermal Conductivity properties by means of guarded hot plate method
ASTM-C-591-69	Standard specification for rigid preformed cellular urethane thermal insulation
IS:4894	Centrifugal Fans
BS:848	Method of Performance Test for Centrifugal Fans
IS:325	Induction motors, three-phase
IS:4722	Rotating electrical machines
IS:1231	Three phase foot mounted Induction motors, dimensions of
IS:2233	Designations of types of construction and mounting arrangements of rotating electrical machines
IS:2254	Vertical shaft motors for pumps, dimensions of
IS:7816	Guide for testing insulation resistance of rotating machines
IS:4029	Guide for testing three phase induction motors
IS: 4729	Rotating electrical machines, vibration of, Measurement and evaluation of
IS:4691	Degree of protection provided by enclosures for rotating electrical machinery
IS:7572	Guide for testing single-phase ac motors
IS:2148	Flame proof enclosure for electrical apparatus
BS:4999(Part-51)	Noise levels
Galvanizing	
IS-209	Zinc Ingot
IS-2629	Recommended Practice for Hot-Dip galvanizing on iron and steel
IS-2633	Methods for testing uniformity of coating of zinc coated articles
ASTM-A-123	Specification for zinc (Hot Galavanizing) Coatings, on products Fabricated from rolled, pressed and forged steel shapes, plates, bars and strips
ASTM-A-121-77	Zinc-coated (Galvanized) steel barbed wire
Painting	
IS-6005	Code of practice for phosphating of iron and steel
ANSI-Z551	Gray finishes for industrial apparatus and equipment
SSPEC	Steel structure painting council
Fire protection system	
--	Fire protection manual issued by tariff advisory committee (TAC) of India
HORIZONTAL CENTRIFUGAL PUMPS	
IS:1520	Horizontal centrifugal pumps for clear, cold and fresh water
IS:9137	Code for acceptance test for centrifugal & axial pumps

CODES	TITLE
IS:5120	Technical requirement – Rotodynamic special purpose pumps
API-610	Centrifugal pumps for general services Hydraulic Institutes Standards
BS:599	Methods of testing pumps
PTC-8.2	Power Test Codes - Centrifugal pumps
DIESEL ENGINES	
IS:10000	Methods of tests for internal combustion engines
IS:10002	Specification for performance requirements for constant speed compression ignition engines for general purposes (above 20 kW)
BS:5514	The performance of reciprocating compression ignition (Diesel) engines, utilizing liquid fuel only, for general purposes
ISO:3046	Reciprocating internal combustion engines performance
IS:554	Dimensions for pipe threads where pressure tight joints are required on threads
ASME Power Test Code	Internal combustion engine PTC-17
--	Codes of Diesel Engine Manufacturer's Association, USA
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)
IS:3582	Basket strainers for fire-fighting purposes (cylindrical type)
IS:3589	Electrically welded steel pipes for water, gas and sewage (150 to 2000 mm nominal diameter)
IS:4038	Foot valves for water works purposes
IS:4927	Unlined flax canvas hose for fire fighting

CODES	TITLE
IS:5290	Landing valves (internal hydrant)
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
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:5572 (Part-I)	Classification of hazardous areas for electrical installations (Areas having gases and vapours)
IS:6362	Designation of methods of cooling for rotating electrical machines
IS:6381	Construction and testing of electrical apparatus with type of protection 'e'
IS:7816	Guide for testing insulation for rotating machine
IS:4064	Air break switches
IEC DOCUMENT 2 (Control Office) 432	Three Phase Induction Motor
VDE 0530 Part I/66	Three Phase Induction Motor
IS:9224 (Part-II)	HRC Fuses
IS:6875	Push Button and Control Switches
IS:694	PVC Insulated cables
IS:1248	Indicating instruments
IS:375	Auxiliary wiring & busbar markings

CODES	TITLE
IS:2147	Degree of protection
IS:5	Colour Relay and timers
IS:2959	Contactors
PG Test Procedures	
NFPA-13	Standard for the installation of sprinkler system
NFPA-15	Standard for water spray fixed system for the fire protection
NFPA-12A	Standard for Halong 1301 Fire Extinguishing System
NFPA-72E	Standard on Automatic Fire Detectors
--	Fire Protection Manual by TAC (Latest Edition)
NFPA-12	Standard on Carbon dioxide extinguisher systems
IS:3034	Fire of industrial building
--	Electrical generating and distributing stations code of practice
IS:2878	CO2 (Carbon dioxide) Type Extinguisher
IS:2171	DC (Dry Chemical Powder) type
IS:940	Pressurised Water Type
D.G. SET	
IS:10002	Specification for performance requirements for constant speed compression ignition (diesel engine) for general purposes
IS:10000	Method of tests for internal combustion engines
IS:4722	Rotating electrical machines-specification
IS:12063	Degree of protection provided by enclosures
IS:12065	Permissible limit of noise levels for rotating electrical machines
--	Indian Explosive Act 1932
Steel structures	
IS-228 (1992)	Method of Chemical Analysis of pig iron, cast iron and plain carbon and low alloy steels.
IS-802 (P1 to 3)	Code of practice for use of structural steel in overhead transmission line towers
IS-806	Code of practice for use of steel tubes in general building construction
IS-808	Dimensions for hot rolled steel beam, column channel and angle sections
IS-814	Covered electrodes for manual arc welding of carbon of carbon manganese steel
IS-816	Code of Practice for use of metal arc welding for general construction in Mild steel
IS-817	Code of practice for training and testing of metal arc welders. Part 1 : Manual Metal arc welding
IS-875 (P1 to P4)	Code of practice for design loads (other than earthquake) for buildings and structures
IS-1161	Steel tubes for structural purposes

CODES	TITLE
IS-1182	Recommended practice for radiographic examination of fusion welded butt joints in steel plates
IS-1363 (P1 to P3)	Hexagonal head bolts, screws & nuts of products grade C
IS-1364	Hexagon head bolts, screws and nuts of product grades A and B
IS-1367 (P1 to P18)	Technical supply condition for threaded steel fasteners
IS-1599	Methods for bend test
IS-1608	Method for tensile testing of steel products
IS-1893	Criteria for earthquake resistant design of structures
IS-1978	Line Pipe
IS-2062	Steel for general structural purposes
IS-2595	Code of practice for Radiographic testing
IS-3063	Single coil rectangular section spring washers for bolts, nuts and screws
IS-3664	Code of practice for ultrasonic pulse echo testing by contact and immersion methods
IS-7205	Safety code for erection of structural steel work
IS-9595	Recommendations for metal arc welding of carbon and carbon manganese steels
ANSI-B18.2.1	Inch series square and Hexagonal bolts and screws
ANSI-B18.2.2	Square and hexagonal nuts
ANSI-G8.14	Round head bolts
ASTM-A6	Specification for General Requirements for rolled steel plates, shapes, sheet piling and bars of structural use
ASTM-A36	Specifications of structural steel
ASTM-A47	Specification for malleable iron castings
ASTM-A143	Practice for safeguarding against embilement of Hot Galvanized structural steel products and procedure for detaching embrilement
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 tower bolts and nuts
ASTM-441	Specification for High strength low alloy structural manganese vanadium steel
ASTM-A572	Specification for High strength low alloy colombium-Vanadium steel of structural quality
AWS D1-0	Code for welding in building construction welding inspection
AWS D1-1	Structural welding code
AISC	American institute of steel construction
NEMA-CG1	Manufactured graphite electrodes

CODES	TITLE
Piping and pressure vessels	
IS-1239 (Part 1 and 2)	Mild steel tubes, tubulars and other wrought steel fittings
IS -3589	Seamless Electrically welded steel pipes for water, gas and sewage
IS-6392	Steel pipe flanges
ASME	Boiler and pressure vessel code
ASTM-A120	Specification for pipe steel, black and hot dipped, zinc-coated (Galvanized) welded and seamless steel pipe for ordinary use
ASTM-A53	Specification for pipe, steel, black, and hot-dipped, zinc coated welded and seamless
ASTM-A106	Seamless carbon steel pipe for high temperature service
ASTM-A284	Low and intermediate tensile strength carbon-silicon steel plates for machine parts and general construction
ASTM-A234	Pipe fittings of wrought carbon steel and alloy steel for moderate and elevated temperatures
ASTM-S181	Specification for forgings, carbon steel for general purpose piping
ASTM-A105	Forgings, carbon steel for piping components
ASTM-A307	Carbon steel externally threated standard fasteners
ASTM-A193	Alloy steel and stainless steel bolting materials for high temperature service
ASTM-A345	Flat rolled electrical steel for magnetic applications
ASTM-A197	Cupola malleable iron
ANSI-B2.1	Pipe threads (Except dry seal)
ANSI-B16.1	Cast iron pipe flangesand glanged fitting. Class 25, 125, 250 and 800
ANSI-B16.1	Malleable iron threaded fittings, class 150 and 300
ANSI-B16.5	Pipe flanges and flanged fittings, steel nickel alloy and other special alloys
ANSI-B16.9	Factory-made wrought steel butt welding fittings
ANSI-B16.11	Forged steel fittings, socket-welding and threaded
ANSI-B16.14	Ferrous pipe plug, bushings and locknuts with piple threads
ANSI-B16.25	Butt welding ends
ANSI-B18.1.1	Fire hose couplings screw thread
ANSI-B18.2.1	Inch series square and hexagonal bolts and screws
ANSI-B18.2.2	Square and hexagonal nuts
NSI-B18.21.1	Lock washers
ANSI-B18.21.2	Plain washers
ANSI-B31.1	Power piping
ANSI-B36.10	Welded and seamless wrought steel pipe
ANSI-B36.9	Stainless steel pipe
Other civil works standards	

CODES	TITLE
IS-269	33 grade ordinary portland cement
IS2721	Galvanized steel chain link fence fabric
IS-278	Galvanized steel barbed wire for fencing
IS-383	Coarse and fine aggregates from natural sources for concrete
IS-432 (P1 and P2)	Mild steel and medium tensile steel bars and hard-dawn steel wire for concrete reinforcement
IS-456	Code of practice for plain and reinforced concrete
IS-516	Method of test for strength of concrete
IS-800	Code of practice for general construction in steel
IS-806	Steel tubes for structural purposes
IS-1172	Basic requirements for water supply, drainage and sanitation
IS-1199	Methods of sampling and analysis of concrete
IS-1566	Hard-dawn steel wire fabric for concrete reinforcement
IS-1742	Code of Practice for Building drainage
IS-1785	Plain hard-drawn steel wire for pre-stressed concrete
IS-1786	High strength deformed Steel Bars and wires for concrete reinforcement
IS-1811	Methods of sampling Foundry sands
IS-1893	Criteria for earthquake resistant design of structures
IS-2062	Steel for general structural purposes
IS-2064	Selection, installation and maintenance of sanitary appliances-code of practices
IS-2065	Code of practice for water supply in buildings
IS-2090	High tension steel bars used in pre-stressed concrete
IS-2140	Standard Galvanized steel wire for fencing
IS-2470 (P1 & P2)	Code of practice for installation of septic tanks
IS-2514	Concrete vibrating tables
IS-2645	Integral cement waterproofing compounds
IS-3025 (Part 1 to Part 48)	Methods of sampling and test (Physical and chemical) for water and waste water
IS-4091	Code of practice for design and construction of foundations for transmission line towers and poles
IS-4111 (Part 1 to P5)	Code of practice for ancillary structures in sewerage system
IS-4990	Plywood for concrete shuttering work
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)

CODES	TITLE
	rame 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 BS:443-1969	Methods for Determination of Mass of zinc coating on zinc coated Iron and Steel Articles
IS:8263	Methods for Radio Interference
IEC:437-1973 NEMA:107-1964 CISPR	Test on High Voltage Insulators
IS:209, BS:3436-1961	Zinc Ingot
IS:398 Part - V IEC:209-1966	Aluminum Conductors for Overhead Transmission Purposes
BS:215(Part-II), IEC:209-1966	Aluminium Conductors galvanized steel reinforced extra high voltage (400 kV and above)
IS:1778, BS:1559-1949	Reels and Drums for Bare Conductors
IS:1521, ISO/R89-1959	Method for Tensile Testing 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/ ASTMA-472-729	Hot dip galvanised coatings on round steel wires
GALVANISED STEEL EARTHWIRE	
IS:1521, ISO/R:89-1959	Method for Tensile Testing 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	Methods for testing Uniformity of Coating of Zinc Coated Articles
IS:4826/ ASTM: A 475-72a BS:443-1969	Hot dip Galvanised Coatings on Round Steel Wires
IS:6745/ BS:443-1969	Method for Determination of mass of Zinc Coating on Zinc coated Iron and Steel Articles.
IS:209/ BS:3463-1961	Zinc ingot
IS:398 (Pt. I to P5:1992)/ BS:215 (Part-II	Aluminum Conductors for overhead transmission purposes

CODES	TITLE
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 (non-flameproof type)
IS:10322	Specification for flood light
IS:10322	Specification for decorative lighting outfits
IS:10322	Luminaries for street lighting
IS:2418	Tubular fluorescent lamps
IS:9900	High pressure mercury vapour lamps
IS:1258	Specification for Bayonet lamp fluorescent lamp
IS:3323	Bi-pin lamp holder tubular fluorescent lamps
IS:1534	Ballasts for use in fluorescent lighting fittings. (Part-I)
IS:1569	Capacitors for use in fluorescent lighting fittings
IS:2215	Starters for fluorescent lamps
IS:3324	Holders for starters for tubular fluorescent lamps
IS:418	GLS lamps
IS:3553	Water tight electric fittings
IS:2713	Tubular steel poles
IS:280	MS wire for general engg. Purposes
Conduits, Accessories and Junction Boxes	
IS:9537	Rigid steel conduits for electrical wiring
IS:3480	Flexible steel conduits for electrical wiring
IS:2667	Fittings for rigid steel conduits for electrical wiring
IS:3837	Accessories for rigid steel conduits for electrical wiring
IS:4649	Adaptors for flexible steel conduits
IS:5133	Steel and Cast Iron Boxes
IS:2629	Hot dip galvanising of Iron & Steel
Lighting Panels	
IS:13947	LV Switchgear and Control gear(Part 1 to 5)
IS:8828	Circuit breakers for over current protection for house hold and similar installations
IS:5	Ready mix paints
IS:2551	Danger notice plates
IS:2705	Current transformers

CODES	TITLE
IS:9224	HRC Cartridge fuse links for voltage above 650V(Part-2)
IS:5082	Wrought aluminium and Al. alloys, bars, rods, tubes and sections for electrical purposes
IS:8623	Factory built Assemblies of Switchgear and Control Gear for voltages upto and including 1000V AC and 1200V DC
IS:1248	Direct Acting electrical indicating instruments
Electrical Installation	
IS:1293	3 pin plug
IS:371	Two to three ceiling roses
IS:3854	Switches for domestic and similar purposes
IS:5216	Guide for safety procedures and practices in electrical work
IS:732	Code of practice for electrical wiring installation (system voltage not exceeding 650 Volts.)
IS:3043	Code of practice for earthing
IS:3646	Code of practice of interior illumination part II & III
IS:1944	Code of practice for lighting of public through fares
IS:5571	Guide for selection of electrical equipment for hazardous areas
IS:800	Code of practice for use of structural steel in general building construction
IS:2633	Methods of Testing uniformity of coating on zinc coated articles
IS:6005	Code of practice for phosphating iron and steel
	INDIAN ELECTRICITY ACT
	INDIAN ELECTRICITY RULES
LT SWITCHGEAR	
IS:8623 (Part-I)	Specification for low voltage switchgear and control gear assemblies
IS:13947 (Part-I)	Specification for low voltage switchgear and control gear, Part 1 General Rules
IS:13947 (part-2)	Specification for low voltage switchgear and control gear, Part 2 circuit breakers
IS:13947 (part-3)	Specification for low voltage switchgear and control gear. Part 3 Switches, Disconnectors, Switch-disconnectors and fuse combination units
IS:13947 (part-4)	Specification for low voltage switchgear and control gear. Part 4 Contactors and motors starters
IS:13947 (part-5)	Specification for low voltage switchgear and control gear. Part 5 Control-circuit devices and switching elements
IS:13947 (part-6)	Specification for low voltage switchgear and control gear. Part 6 Multiple function switching devices
IS:13947 (part-7)	Specification for low voltage switchgear and control gear. Part 7 Ancillary equipments
IS:12063	Degree of protection provided by enclosures

CODES	TITLE
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)	Low voltage fuses for voltage not exceeding 1000V AC or 1500V DC Part 1 General Requirements
IS:13703 (part 2)	Low voltage fuses for voltage not exceeding 1000V AC or 1500V DC Part 2 Fuses for use of authorized persons
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

Note: If any standard is expired or does not exist anymore than other standard which has substituted it, shall be applicable.

Annexure-G

MQP & INSPECTION LEVEL REQUIREMENT

Sl. No	Item / Equipment	Reference document for inspection	Inspection Level
A.01	LT Transformer /Power Transformer/ Reactor/ Converter Transformer/ Filter Reactor	MQP/ITP	IV
A.02	Bushing	MQP	IV
A.03	Insulating Oil	POWERGRID TS	III
A.04	Oil storage tank for transformers	MQP	III
A.05	Nitrogen injection based explosion prevention system	FAT/ITP	III
A.06	On Line oil drying system for transformers	POWERGRID TS	II**
A.07	On Line DGA and moisture monitoring system	POWERGRID TS	II**
A.08	Flow sensitive conservator isolation valve	POWERGRID TS	II**
A.09	Oil Filtration Machine	MQP	III
B.01	Circuit Breakers	MQP	IV
B.02	Current Transformers	MQP/ITP	IV
B.03	CVT/PT/IVT	MQP	IV
B.04	Isolators	MQP/ITP	IV
B.05	Surge Arrestors	MQP/ITP	III
B.06	Line Trap & Air Core Reactor	MQP/ITP	III
B.07	Point On switching device (CSD) for Circuit Breaker (wherever required)	FAT/ITP	IV
C.01	STATCOM including Valve, valve base electronics, DC capacitor, series reactor and all accessories	ITP	IV
C.02	Mechanically switched Reactor bank (3-ph) including all accessories (MSR Branches)	ITP	IV
C.03	Mechanically switched Capacitor bank (3-ph) including all accessories (MSC Branches)	ITP	IV
C.04	Harmonic Pass filters	ITP	IV
C.05	HT Capacitor	MQP	IV
D.01	Thyristor Valve	FAT/ITP	III
D.02	PLC Capacitors for HVDC	FAT/ITP	III
D.03	Valve Cooling system for	FAT/ITP	III

Annexure-G

Sl. No	Item / Equipment	Reference document for inspection	Inspection Level
	HVDC		
D.04	AC/DC Filter Resistors	ITP	III
D.05	DC Current and Voltage measuring device for HVDC	FAT/ITP	III
D.06	Maintenance platform for valve hall	POWERGRID TS	II
D.07	Optical signal column for FSC	FAT/ITP	II
E.01	GIS including spares	MQP/ITP	IV
E.02	Dew Point Meter for GIS	POWERGRID TS	I*
E.03	Portable Partial Discharge monitoring system for GIS	POWERGRID TS	I*
E.04	Partial Discharge Monitoring System (Online) for GIS	ITP	III
E.05	PEB Structure and Puf Panels	MQP	III
F.01	Substation Automation system	FAT/MQP	III
F.02	Event Logger	POWERGRID TS	III
F.03	PLCC equipment Viz PLCC Terminal ,Carrier equipment, Protection Coupler , Coupling Device but excluding EPAX / HF Cable	MQP	III
F.04	Control & Relay Panels	MQP	III
G.01	EHV Cables	MQP/ITP	III
G.02	Power Cables & Control Cables	MQP	III
G.03	Cable Joints (11 kV and above)	POWERGRID TS	II
G.04	Cable Lugs & Glands / Clamps/Terminations	POWERGRID TS	I
H.01	LT Switchgear & ACDB/DCDB/MLDB/ELDB	MQP	III
H.02	Battery	POWERGRID TS	II
H.03	Battery Charger	MQP	III
H.04	UPS & Voltage Stablizer	MQP/FAT	III
H.05	D. G. Set	FAT/ITP	III
H.06	Lighting Panel	POWERGRID TS	II
H.07	Lighting Poles	POWERGRID TS	II
H.08.1	Lighting Fixtures, Lighting Earthwire, Switches / sockets, Conduits, Lamps & fans including exhaust fans	POWERGRID TS	I
H.8.2	Solar based LEDs System including street light/pole solar panel, Inverter controller/LED fixture	FAT	III
H.09	MS/GI /PVC Pipes for cable	POWERGRID TS	I

Annexure-G

Sl. No	Item / Equipment	Reference document for inspection	Inspection Level
	trenches and lighting		
H.10	Outdoor Receptacle	POWERGRID TS	I
H.11	Split A.C/window A.C./ precision AC/ Kiosk AC/ Cascade AC/ Tower AC	POWERGRID TS	I
H.12	Occupancy sensors for control of lighting	POWERGRID TS	I
H.13	Solar based street lighting pole including Solar Panel, Inverter, Controller, etc.	POWERGRID TS	III
H.14	Junction Box / Lighting Switch Boards / Bay MB / Portable Flood Light Panel	POWERGRID TS	II
H.15	Lighting transformer	POWERGRID TS	II
I.01	SF6 gas processing unit, SF6 gas Leakage detector, SF6 gas Analyzer	POWERGRID TS	I*
I.02	SF6 Gas	POWERGRID TS	I
I.03	Spark Gap	FAT/ITP	III
I.04	Time synchronizing Equipment (GPS Clock)	POWERGRID TS	I
I.05	Galvanized Cable trays	POWERGRID TS	II
I.06	Video Monitoring System	FAT/ITP	I
I.07	Public Address System (All Components)	POWERGRID TS	I
I.08	Building Management System (All components)	POWERGRID TS	I
I.09	Access Control System (All Components)	POWERGRID TS	I
I.10	Video Display system/ Video Projection system	POWERGRID TS	I
I.11	VESDA (smoke detector)	POWERGRID TS	I
I.12	High Mast Pole	MQP	III
J.01	Aluminium ladder	POWERGRID TS	I
J.02	Hume Pipes	POWERGRID TS	I
J.03	Castle Key	POWERGRID TS	I
J.04	Water Treatment plant (All components).	POWERGRID TS	I
J.05	Furniture	POWERGRID TS	I
J.06	DOL Starter	POWERGRID TS	I
J.07	Oil Sample Bottles and Syringe	POWERGRID TS	I
J.08	Test & Measuring Equipment, T&P	POWERGRID TS	I*
K.01	EOT Crane	POWERGRID TS	II

Annexure-G

Sl. No	Item / Equipment	Reference document for inspection	Inspection Level
K.02	Boom Crane/Golf Cart/Platform Truck/Man Lift/ Fork Lift/ Lifts	POWERGRID TS	II
L.00	Fire Protection System		
L.001	Panels, Hydro pneumatic tank for fire protection system.	POWERGRID TS	III
L.002	Deluge valve, Strainers, MS/GI pipes, Pumps, motors, air compressor, and other valves, Diesel Engines	POWERGRID TS	II
L.003	Others	POWERGRID TS	I
M.00	HVAC SYSTEM		
M.001	Air Cooled Chiller	POWERGRID TS	III
M.002	Pump	POWERGRID TS	II
M.003	Air Handling Unit	POWERGRID TS	II
M.004	Fan Filter Unit With Centrifugal Blower	POWERGRID TS	II
M.005	Axial Flow Fan	POWERGRID TS	II
M.006	Main Climate Control Unit (Dehumidifier)	POWERGRID TS	I
M.007	Dampers	POWERGRID TS	II
M.008	Fire Dampers	POWERGRID TS	II
M.009	Pressure Gauge, Thermometers, Other Instruments / Sensors	POWERGRID TS	I
M.010	Grill, Diffuser, Jet Nozzle, Louvers etc	POWERGRID TS	I
M.011	Ducting	POWERGRID TS	III
M.012	M S Pipe	POWERGRID TS	II
M.013	Pipe Insulation Material	POWERGRID TS	I
M.014	Duct Insulation Material	POWERGRID TS	I
M.015	Underdeck Insulation Material	POWERGRID TS	I
M.016	Gate Valve & Non Return valve	POWERGRID TS	I
M.017	Y Strainer	POWERGRID TS	II
M.018	Ball Valve/ Motorised Butterfly Valve/ Balancing Valve	POWERGRID TS	I
M.019	Closed Expansion Tank	POWERGRID TS	II
M.020	Air Separator	POWERGRID TS	I
M.021	MCC /PLC /Electrical Panels	POWERGRID TS	III
M.022	Propeller Fan/ Conduit	POWERGRID TS	II
M.023	Air Filter/ Mixing Valve with Thermostat	POWERGRID TS	I

Annexure-G

Sl. No	Item / Equipment	Reference document for inspection	Inspection Level
N.01	SDH Equipment	FAT/ITP	IV
N.02	Termination Equipment Primary/ DI Multiplexer	FAT/ITP	IV
N.03	DACS	FAT/ITP	IV
N.04	Optical Amplifier	FAT/ITP	IV
N.05	FODP including pigtail, Joint Box, FDMS	FAT/ITP	II
N.06	IMPS	FAT/ITP	IV
N.07	Optical bypass switch	FAT/ITP	IV
N.08	Air Purifier	FAT/ITP	I
N.09	Patch cord & connector	FAT/ITP	I
N.10	NMS	FAT/ITP	IV
N.11	OPGW Cable	MQP/ITP/FAT	III
N.12	Hardware Fittings for OPGW cable	MQP/ITP	III
N.13	DCPS	FAT/ITP	III
N.14	Radio Links	FAT/ITP	III
N.15	SMPS based DC Power Supply (DCPS) system	FAT/ITP	III
N.16	WAMS (PMU & Accessories)	FAT/ITP	III
N.17	PUF Shelter	FAT/ITP	III
N.18	Aerial OFC/UGOFC/ADSS/FO Cable	FAT/ITP	III
N.19	DWDM	FAT/ITP	III
N.20	OTN	FAT/ITP	III
N.21	MPLS-TP Equipment	FAT/ITP	III
N.22	L2 Switch	FAT/ITP	III
N.23	IP-MPLS Router	FAT/ITP	III
N.24	HDPE Pipes	POWERGRID TS	II
N.25	Equipment Cabinets	POWERGRID TS	II
N.26	Main Distribution Frame	POWERGRID TS	I
N.27	Telephone system, EPAX, Telephone wires, Telephone sockets	POWERGRID TS	I
N.28	Fibre Optic Cable	MQP	III
N.29	Hardware Fittings for Fibre Optic cable	MQP	III
O.01	Re-rollers of MS/HT Angle Section and galvanized tower parts.	MQP	IV
O.02	Conductor	MQP	IV
O.03	Hardware fittings and Conductor & Earthwire Accessories	MQP	IV
O.04	Earth wire	MQP	IV

Annexure-G

Sl. No	Item / Equipment	Reference document for inspection	Inspection Level
O.05	Insulator	MQP	IV
O.06	Bolts & Nuts of Gr 8.8 / 8	MQP	IV
O.07	Mono Pole	MQP	IV
O.08	Foundation Bolts & Anchor Bolts	POWERGRID TS	III
O.09	D-shackle/ Hanger / Links and associated Special bolt/nuts	MQP	III
O.10	Span Marker, Obstruction lights and Wind Measuring Equipment	POWERGRID TS	III
O.11	MS ROD rolled by Approved Re-roller of POWERGRID	MQP	III
O.12	MS ROD rolled by Approved steel producers of POWERGRID	POWERGRID TS	I
O.13	Spring Washers & Pack washers	POWERGRID TS	II
O.14	Bolts & Nuts Gr up to 5.6/5	POWERGRID TS	II
O.15	ACD & Barbed wire for ACD/Bird guard	POWERGRID TS	II
O.16	Danger Plate /Phase Plate / Number Plate / Circuit plate	POWERGRID TS	I
O.17	Sub Station Structure (lattice/pipe type)	MQP	III
O.18	Clamps & Connecters (including equipment connectors)	MQP	III
O.19	MS/ GI Flat, rod type, pipe type and other earthing material.	POWERGRID TS	II
O.20	Aluminium Tube & Busbar materials	POWERGRID TS	II
O.21	Pipe Type & Counter Poise Earthing	POWERGRID TS	II
O.22	DTS System	POWERGRID TS	II

For Equipment where requirement of MQP is envisaged, ITP/FAT will be followed If sourced from off shore. For items required in S/S or T/L or TELECOM/LD&C , same inspection level as specified shall be followed for all the cases.

*MICC for test and measuring equipment (inspection level I or II) shall be issued only after actual verification/ demonstration of satisfactory performance at site.

** Though level-2 items, CIP/MICC can be issued also on review of TCs and visual inspection of these item.

ANNEXURE-J

LIST OF THE MAKES FOR WHICH TYPE TEST REPORTS NOT REQUIRED TO BE SUBMITTED

Sl. No.	ITEM DESCRIPTION	MAKE
A.	***Substation Accessories [Type Testing is not envisaged]***	
1.	Out door receptacles	CGL/B&C/BCH/Sakti, Chennai/Indo Asian/AVAIDS
2.	Trefoil clamp	Moulded Fibre Glass Products, Calcutta
3.	Diesel Engine	Cummins/Ruston & Hornsby/Greaves Cotton/Kirloskar/Mahindra/Ashok Leyland
4.	Alternator	AVK/KIRLOSKAR/STAMFORD/ Leroy Somer
5.	Motors	KEC/Siemens/NGEF/Crompton/ABB
6.	Cable Glands	Sunil & Co./Arup/ Comet/QPIE
7.	Junction Box	Sarvana/ECS/C&S/Vikas/ Maktel/Unilac/Jasper/ Amara raja/AVAIDS
8.	EPAX	MATRIX, BPL
9.	ACSR Conductor (Bersimis/Moose/Zebra)	Sterlite/Apar/HVPL/Sharavathy/Hiren Aluminium Ltd./Smita/Deepak Cables/Polycab wires/Cabcon/JSK
10.	AAC Conductor (BULL)	Sterlite/Cabcon /JSK
11.	G.S. Earthwire	Sharavathy/Bharat Wire Ropes/Ramswarup
12.	Lighting Fixtures	Phillips/CGL/Bajaj /Havels
13.	Lighting Transformer	Gujarat-Plug-In
14.	Lighting Panels	Vikas/Makel/Nitya/AVAIDS
15.	MCCB/ACB/Protective relays of LT Switchgear Boards	All approved makes as per Compendium of Vendors
16.	EOT Crane	Reva
B.	***ACCESSORIES FOR TRANSFORMER & REACTOR [Earlier approved type test reports is applicable and not required to be submitted]***	
17.	BUCHHOLZ RELAY *[Upto 765kV Transformer & Reactor]*	(i) M/S CEDESPE, ITLAY [Model Type-EE 3 (Plug & Socket type)]/ (ii) M/s VIAT INSTRUMENTS PVT. LTD.KOLKATA [Model type-GOR-3M (Plug & Socket type)]
18.	PRESSURE RELIEF DEVICE *[Upto 765kV Transformer & Reactor]*	(i) M/S SUKRUT UDYOG, Pune [Model type-T-6-MS-15-SHB-PS (Plug & Socket type)] /
19.	MAGNETIC OIL LEVEL GAUGE *[Upto 765kV Transformer & Reactor]*	(i) M/S SUKRUT UDYOG PUNE [Model type-SO-HE-10-M-ATMS-PS (Plug & Socket type)], [Model Type:- SO-6-M-P-PS (Plug & Socket type)]/
20.	AIR CELL (FLEXIBLE AIR SEPARATOR) *[Upto 765kV Transformer & Reactor]*	Type test of following makes are not to be submitted (i) M/S PRONAL FRANCE / (ii) FUJIKURA,JAPAN / (iii) PRONAL ASIA, MALAYSIYA / (iv) SHENYANG HONGDA GENERAL RUBBER FACTORY /

ANNEXURE-J

LIST OF THE MAKES FOR WHICH TYPE TEST REPORTS NOT REQUIRED TO BE SUBMITTED

Sl. No.	ITEM DESCRIPTION	MAKE
		(v) BAODING XINKE RUBBER PRODUCT INSTITUTE, CHINA / (vi) M/S ZENITH INDUSTRIAL RUBBER PRODUCTS PVT. LTD. THANE/ (vii) M/S UNIRUB TECHNO PUNE
21.	OTI & WTI *[Upto 765kV Transformer & Reactor]*	(i) M/S PRESIMEASURE BANGALORE [Model type-1005A
22.	OIL PUMP *[Upto 765kV Transformer & Reactor]*	(i) FLOWWELL PUMPS & METERS, BANGALORE [Model type-1220D, 1250D
23.	COOLING FAN AND MOTOR ASSEMBLY *[Upto 765kV Transformer & Reactor]*	(i) M/S MARATHON LTD KOLKATA [Model Type:-36M/K75-P8, 0.7kW, 725RPM, 22J/K37-P6, 0.25kW, 940RPM,AFF 915103, 0.625kW, 550RPM]
24.	Sudden Pressure Relay *[Upto 765kV Transformer & Reactor]*	(i) Qualitrol [Model/Drawing No.900-003-02 CS-46518, 900-003-32 CS-46369] / (ii) Shenyang KEQI Electrical Equipment Co. Ltd. [Model/Drawing No.SYJ9-50-25TH]
25.	BUCHHOLZ RELAY *[Upto 400kV Transformer & Reactor]*	(i) M/S CEDASPE, ITALY [Model type-EE3 (Plug & Socket type)]/ (ii) VIAT INSTRUMENTS [Model type-GOR-3M (Plug & Socket type)]
26.	PRESSURE RELIEF DEVICE *[Upto 400kV Transformer & Reactor]*	(i) M/S SKURUT UDYOG, PUNE [Model type-T-6-MS-15-SHB-PS (Plug & Socket type)]
27.	MAGNETIC OIL LEVEL GAUGE *[Upto 400kV Transformer & Reactor]*	(i) M/S SUKRUT UDYOG PUNE [Model type-SO-HE-10-M-ATMS-PS (Plug & Socket type)], [Model Type: SO-6-M-P-PS (Plug & Socket type)]/ (ii) M/S YOGYA ENTERPRISES, JHANSI [Model type-SO-10 (Plug & Socket type)]
28.	AIR CELL (FLEXIBLE AIR SEPARATOR) *[Upto 400kV Transformer & Reactor]*	Type test of following makes are not to be submitted (i) M/S THE RUBBER PRODUCTS MUMBAI / (ii) M/S UNIRUB TECHNO PUNE / (iii) M/S PRONAL FRANCE/ (iv) M/S ZENITH INDUSTRIAL RUBBER PRODUCTS PVT. LTD. THANE / (v) SHENYANG HONGDA GENERAL RUBBER FACTORY, CHINA
29.	Sudden Pressure Relay *[Upto 400kV Transformer & Reactor]*	(i) Qualitrol [Model/Drawing No.900-003-02 CS-46518, 900-003-32 CS-46369] / (ii) VIAT INSTRUMENTS [Model/Drawing No.950 / (iii) Shenyang KEQI Electrical Equipment Co. Ltd. [Model/Drawing No.SYJ9-50-25TH]
30.	RIP Bushing (52kV, 3150A)	ABB Micafil, Switzerland [Model/Drawing No. 1ZCD073617 (Rev F)]
31.	RIP Bushing (420kV, 1250A)	ABB, SWEDEN [Model/Drawing No.1ZSC005378A0001 REV. K]
32.	RIP Bushing (245kV, 1250A)	ABB, SWEDEN [Model/Drawing No.1ZSC005416A0001 (Rev. D)]
33.	RIP Bushing (245kV, 2000A)	ABB, SWEDEN [Model/Drawing No.1ZSC005373A0001

ANNEXURE-J

LIST OF THE MAKES FOR WHICH TYPE TEST REPORTS NOT REQUIRED TO BE SUBMITTED

Sl. No.	ITEM DESCRIPTION	MAKE
		(Rev. C)]
34.	RIP Bushing (420kV, 1250A)	HSP Germany [Model/Drawing No.327470]
35.	RIP Bushing (245kV, 2000A)	HSP Germany [Model/Drawing No.329260]
36.	RIP Bushing (52kV, 3150A)	HSP Germany [Model/Drawing No.329280]
37.	RIP Bushing (420kV, 1250A)	Izolyator, Russia [Model/Drawing No.686354.603]
38.	RIP Bushing (245kV, 2000A)	Izolyator, Russia [Model/Drawing No.686353.602]
39.	RIP Bushing (52kV, 3150A)	Izolyator, Russia [Model/Drawing No.686351.601]
40.	RIP Bushing (145kV, 1250A)	Izolyator, Russia [Model/Drawing No.686352.604]
41.	RIP Bushing (420kV, 1250A)	TRENCH, CHINA [Model/Drawing No.ECT 707 (C2)]
42.	RIP Bushing (245kV, 2000A)	TRENCH, CHINA [Model/Drawing No.ECT 617 (C3)]
43.	RIP Bushing (245kV, 1250A)	TRENCH, CHINA [Model/Drawing No.ECT 616 (C3)]
44.	RIP Bushing (145kV, 1250A)	TRENCH, CHINA [Model/Drawing No.ECT 516 (C3)]
45.	RIP Bushing (52kV, 1250A)	TRENCH, CHINA [Model/Drawing No.ECT 415 (C3)]
46.	RIP Bushing (52kV, 3150A)	TRENCH, CHINA [Model/Drawing No.ECT 419 (C3)]
47.	RIP Bushing (420kV, 1250A)	Xian China [Model/Drawing No.75706 (Rev 09)]
48.	RIP Bushing (245kV,2000A)	Xian China [Model/Drawing No.75618 (Rev 09)]
49.	RIP Bushing (52kV, 3150A)	Xian China [Model/Drawing No.75366 (Rev 03)]
50.	RIP Bushing (52kV, 3150A)	Xian China [Model/Drawing No.75332 (Rev 08)]
51.	OIP Bushing (800kV, 2500A)	ABB, SWEDEN [Model / Drawing No. GOE-2550-1600-2500-0.6-B, 1ZSC026186-AAM REV. H]
52.	OIP Bushing (420kV, 2500A)	ABB, SWEDEN [Model / Drawing No.GOE-1425-1150-2500-0.6, 1ZSC026186-AAL REV. F]
53.	OIP Bushing (800kV, 2500A)	TBEA, CHINA [Model / Drawing No.TBEA-500-765T-A0035-01, REV. 02]
54.	OIP Bushing (420kV, 2500A)	TBEA, CHINA [Model / Drawing No.TBEA-500-765T-A0035-02, REV. 02]
55.	OIP Bushing (420kV, 2500A)	TRENCH, CHINA [Model / Drawing No.OT-738-1 (C 5)]
56.	OLTC (500MVA, 765kV ICT)	MR Germany [Model/Drawing No. MI 1503 72.5/RC- 12231WR]
57.	OLTC (500MVA, 400kV ICT)	Easun MR, Chennai [Model/Drawing No. 3 x MI 1200 300/D 10.19.3W]
58.	OLTC (220kV & below rating transformer)	BHEL, Bhopal [Model/Drawing No.MIII 600 110/C 10.19.3W]
C.	***TESTING EQUIPMENT FOR TRANSFORMER & REACTOR***	
59.	Oil BDV Test Kit	Baur [Model/Drawing No.DTA 100C]
60.	Oil BDV Test Kit	Megger [Model/Drawing No.OTS 100AF]

ANNEXURE-J

LIST OF THE MAKES FOR WHICH TYPE TEST REPORTS NOT REQUIRED TO BE SUBMITTED

Sl. No.	ITEM DESCRIPTION	MAKE
61.	Online Dissolved Gas (Multi-gas) and Moisture Analyser	A Eberle GmbH & Co. KG [Model/Drawing No.HYDROCAL 1008]
62.	Online Dissolved Gas (Multi-gas) and Moisture Analyser	Ningbo Ligong Online Monitoring Technology Co. LTD [Model/Drawing No.MGA2000]
63.	Online Dissolved Gas (Multi-gas) and Moisture Analyser	GE Energy [Model/Drawing No.KELMAN TRANSFIX]
64.	Online Dissolved Gas (Multi-gas) and Moisture Analyser	Qualitrol Company LLC [Model/Drawing No.SERVERON TM 8]
65.	On line Insulating Oil Drying System	CEE DEE Vacuum Equipment Pvt. Ltd. [Model/Drawing No.TRANSDRY CD-002]
66.	On line Insulating Oil Drying System	PTSS [Model/Drawing No.PTSS-TDS1GA6XS]
67.	Portable Dissolved Gas Analysis of Insulating Oil	GE Energy [Model/Drawing No. KELMAN TRANSPORT X]

NOTES:-

1. For sub-station accessories mentioned at Sr. No. A above, model specific separate approval of type test report is not required.

2. For Transformer/Reactor accessories & testing equipment mentioned at Sr. No. B & C above, wherever, model/drawing no. is specified separate approval of type test report and drawing/documents is not required, thus requirement of type test report validity of 10 years is not applicable.

Sl. No.	Power System Equipment	Minimum Local Content (%)
1	Power Transformers (up to 765 kV, including Generator Transformers)	60
2	Instrument Transformer (up to 765 kV)	60
3	Transformer Oil Dry Out System (TODOS)	60
4	Reactors up to 765 kV	60
5	Oil Impregnated Bushing (Up to 400kV)	60
6	Resin Insulated Paper (RIP) bushings (up to 145 kV)	50
7	Circuit Breakers (up to 765kV AC-Alternating Current)	60
8	Disconnectors, Isolators (up to 765kV AC)	60
9	Wave Trap (up to 765kV AC)	60
10	Oil Filled Distribution Transformers up to & including 33kV [Cold Rolled Grain Oriented (CRGO)/Amorphous, Aluminium/Copper wound]	60
11	Dry type Distribution Transformers up to & including 33kV (CRGO/Amorphous, Aluminium/Copper wound)	60
12	Conventional conductor	60
13	Accessories for conventional conductors	60
14	High Temperature/High Temperature Low Sag (HTLS) conductors (such as Composite core, GAP, ACSS, INVAR, AL59) and accessories	60
15	Optical ground wire (OPGW)- all designs	60
16	Fiber Optic Terminal Equipment (FOTE) for OPGW	50
17	OPGW related Hardware and accessories	60
18	Remote Terminal Unit (RTU)	50
19	Power Cables and accessories up to 33kV	60
20	Control cables including accessories	60
21	XLPE cables up to 220kV	60
22	Substation Structures	60
23	Transmission Line Towers	60
24	Porcelain (Disc/Long Rod) Insulators	60
25	Bus Post Insulators (Porcelain)	60
26	Porcelain Disc Insulators with Room Temperature Vulcanisation (RTV) coating	50
27	Porcelain Long Rod Insulators with Room temperature Vulcanisation (RTV) coating	50
28	Hardware Fittings for porcelain Insulators	60
29	Composite/Polymeric Long Rod Insulators	60
30	Hardware Fittings for Polymer Insulators	60
31	Bird Flight Diverter (BFD)	60
32	Power Line Carrier Communication (PLCC) system (up to 800kV)	60
33	Gas Insulated Switchgear (up to 400kV AC)	60
34	Gas Insulated Switchgear (above 400kV AC)	50
35	Surge/Lightning Arrester (up to 765kV AC)	60
36	Power Capacitors	60
37	Packaged Sub-station (6.6kV to 33kV)	60
38	Ring Main Unit (RMU) (up to 33kV)	60

39	Medium Voltage (MV) GIS panels (up to 33kV)	60
40	Automation and Control system/Supervisory Control and Data Acquisition (SCADA) system in Power system	50
41	Control and Relay panel (including Digital/Numerical relays)	50
42	Electrical motors 0.37kW to 1MW	60
43	Energy meters excluding smart meters	50
44	Control and Power cables and accessories (up to 1.1kV)	60
45	Diesel Generating (DG) set	60
46	DC system (DC Battery & Battery Charger)	60
47	AC and DC Distribution board	60
48	Indoor Air Insulated Switchgear (AIS) up to 33kV	60
49	Poles (PCC, PSCC, Rolled Steel Joist, Rail Pole, Spun, Steel Tubular)	60
50	Material for Grounding/earthing system	60
51	Illumination system	60
52	Overhead Fault Sensing Indicator (FSI)	50
53	Power Quality Meters	50
54	Auxiliary Relays	50
55	Load Break Switch	50
56	Cranes, EOT cranes, gantry crane & chain pulley blocks, etc	60
57	Elevator	60
Fire Protection and Detection system		
58	Motor driven fire water pumps	60
59	Diesel engine driven fire water pumps	60
60	Hydrant system	60
61	High velocity water spray system	60
62	Medium velocity water spray system	60
63	Foam Protection system	60
64	Inert gas flooding system	60
65	Fire tenders	60
66	Portable fire-extinguishers	60

Annexure-V (Revised): Actions required in case of defects observed during warrantee period

Equipment	Nature of problem	Corrective measures to be taken by contractor
CT/**IVT/PT** (Oil filled)	**DGA Violation** H2 > 300 ppm C2H2> 2 ppm	Refurbished or replaced
CT/**IVT/PT** (SF_6 filled)	a) SF6 gas leakage b) High Dew point of SF6 gas (> -36 deg C at atm press)	a)Repair/ replacement b)Re-processing of gas and replacement of Gas in case of no improvement
CT/**IVT/PT** (Oil filled)	**Violation of Tan delta** Tan Delta: >0.5%(during pre-commisioning) >0.7% (in operation) or change w.r.t. to previous **year** value > 0.1%	Replacement
CT, **IVT/PT** & CVT	- Oil leakage - Low Oil level -Sec winding problem leading to open/ short circuit, saturation etc	Replacement or repair as per repair procedure approved by QA.
CVT	Secondary voltage drift: Upto ± 0.5 volts Healthy a) ± 0.5 **or beyond**	a) CVT to be replaced

***Replaced/Repaired/Refurbished Equipment (or part of equipment) shall have 2 years warranty without prejudice to contractual warranty period.**

METHODOLOGY FOR SUPPLY, INSTALLATION & SIZING OF CABLES

Supply of 1.1kV grade Cables:

- The quantities of various type of 1.1kV grade power and control cables shall be assessed by POWERGRID. The Sizes of 1.1 kV grade Control cables to be adopted for installation is enclosed at Appendix I . For Sizes of Power Cable, Clause 1.1.4 of Section Power and control Cable rev 06 is amended at Appendix-II

  For Applications in addition to those specified, appropriate cable size shall be considered by the contractor with prior approval of Employer during execution stage

- Supply of 1.1kV grade power and control cables of various sizes shall be as per unit quantities mentioned in BPS.

- The Cables from Control Room/SPR/ACDB/DCDB/BMK to Equipment Marshalling box (MB)/Local control Cubical (LCC) shall be considered under the BPS item for supply of cables.

- The Interpole cables between AIS Instrument Transformer (CT/CVT), Surge Arrester and associated Junction Box shall be as per unit quantities mentioned in BPS.

- The Interpole cables between Circuit Breaker, Isolator and associated Marshalling box shall be deemed to be included in price of Equipment.

Installation of 1.1kV grade Cables:

- The quantity of Installation of cables is to be assessed by the contractor for the complete scope of work specified in Section project.

- The installation of 1.1kV grade power and control cables (including interpole cable of Equipment & illumination cables) shall be quoted in "LOT" basis.

- Supply and installation of Cable accessories like lugs, glands etc. for entire cabling work shall be deemed to be included in Installation charges of cables quoted by contractor in Bid price schedule.

- No variation shall be admissible on account of Installation of Cables/supply and installation of associated accessories, irrespective of variation (either positive or negative) in supply quantity of Cable specified in BPS.

Extra Consumption of 1.1 kV Power and control cables.

The Contractor shall make every effort to minimise wastage of the cables during installation. The Permitted Overall scarp/wastage shall be limited to 0.50% of actual supplied quantity for each size of cables. Any wastage more than the above limit shall be recovered from the contractor. All balance unused cables shall be returned to the employer by rewinding in separate drums for each size with discrete markings on drums.

Cut pieces of Cables having length less than following shall be considered for Scrap. The Contractor shall dispose of the scrap (if any), at their own cost :

1.) **Length less than 20 M**
   - **a)** Control Cable (3C, 5C, 7C & 10 Core)
   - **b)** Power Cable(2CX 6Sqmm,4CX6Sqmm, 4CX16Sqmm)

2.) **Length less than 50 M**
   - **a)** Control Cable having more than 10 Cores
   - **b)** Power Cable of sizes above 16 Sq mm

For Illumination purpose, ACP's shall be supplied as per BPS. From ACP to luminous all the required cables, accessories(including lugs and gland for cables between MLDB & ACP) , SLP/JB etc as required shall be assessed and supplied by the contractor. The price of these items shall be deemed to be included in price of luminaries.

Appendix-I: Control Cable Sizes

S.No.	From	To	Proposed Cable size
1.	CB MB	CRP panels	i) 10CX2.5Sq mm ii) 19CX1.5 Sq mm iii) 27CX 1.5 Sq mm
2.	CB MB	Earth switch MB	i) 3CX 2.5 Sqmm ii) 5C X2.5 Sq mm
3.	Isolator MB	Earth switch MB	10CX2.5Sq mm
4.	Isolator MB	CRP panels	19CX1.5 Sq mm
5.	CT	CT JB	i) 5C X2.5 Sq mm ii) 10C X2.5 Sq mm
6.	CT JB	CRP panels	i) 5C X2.5 Sq mm ii) 10C X2.5 Sq mm
7.	CVT	CVT JB	i) 5C X2.5 Sq mm ii) 10C X2.5 Sq mm
8.	CVT JB	CRP panels	i) 5C X2.5 Sq mm ii) 10C X2.5 Sq mm
9.	LA	LA JB	3C X2.5 Sq mm
10.	LA JB	CRP panels	5C X2.5 Sq mm
11.	Reactor MB/CMB (for 1-Ph)	CRP panels	i) 3CX2.5Sq mm ii) 5CX2.5 Sq mm iii) 19CX 1.5 Sq mm iv) 27CX 1.5 Sq mm v) Paired Cables
12.	ICT MB/CMB (for 1-Ph)	CRP panels	i) 3CX2.5Sq mm ii) 5CX2.5 Sq mm iii) 19CX 1.5 Sq mm iv) 27CX 1.5 Sq mm v) Paired Cables

Note:

i) For Applications in addition to those specified, appropriate cable size shall be considered by the contractor with prior approval of Employer during execution stage.

ii) GTP of 1.5 Sq mm Cable shall be submitted during detailed engineering stage for employers approval.

iii) In case, more nos. of runs or larger sizes of cables are required between two points based on design calculations, same shall deemed to be included in the scope of bidder.

Appendix-II Power cable sizes.

S.No.	From	To	Existing Cable size	Cable type
1.	Main Switch Board	LT Transformer	2-1C X 630 mm^2 :For each phase 1-1C X 630 mm^2 : for neutral	XLPE
2.	Main Switch Board	AC Distribution Board	2-3½C X 300 mm^2	XLPE
3.	Main Switch Board	Oil Filtration Unit	1-3½C X 300 mm^2	XLPE
4.	Main Switch Board	Colony Lighting	1-3½C X 300 mm2	XLPE
5.	Main Switch Board	HVW pump LCP	1-3½C X 300 mm2	XLPE
6.	Main Switch Board	Main Lighting distribution board	2-3½C X 300 mm2	XLPE
7.	AC Distribution Board	D.G. Set AMF Panel	For 500 kVA DG set: 2-3½C X 300 mm2 For 250 kVA DG set: 1-3½C X 300 mm2	XLPE
8.	AC Distribution Board	Emergency Lighting distribution board	3½C X 70mm2 :For 765/400kV S/s 3½C X 35mm2 :For 400/220kV S/s	PVC
9.	AC Distribution Board	ICT MB	3½C X 70mm2 :For 765/400kV S/s 3½C X 35mm2 :For 400/220kV S/s	PVC
10.	AC Distribution Board	Bay MB	3½C X 70mm2 :For 765/400kV S/s 3½C X 35mm2 For 400/220kV S/s	PVC
11.	Bay MB	AC Kiosk	1-4C X 16 mm2	PVC
12.	AC Distribution Board	Battery Charger 220 V	1-3½C X 70 mm2	PVC

13.	AC Distribution Board	Battery Charger 48 V	1-3½C X 35 mm	PVC
14.	DCDB	Battery	2-1C X 150 mm2	PVC
15.	DCDB	Battery Charger	2-1C X 150 mm2	PVC
16.	DCDB	Protection/PLCC panel	1-4C X 16 mm2 : 765/400kV S/s 1-4C X 6 mm2: 400/220kV S/s	PVC
17.	Main Lighting DB	Lighting panels(Indoor)	1-3½C X 35 mm2	PVC
18.	Main Lighting DB	Lighting panels (outdoor)	1-3½C X 70 mm2	PVC
19.	Main Lighting DB	Receptacles (Indoor)	1-3½C X 35 mm2	PVC
20.	Main Lighting DB	Receptacles (Outdoor)	1-3½C X 70 mm2	PVC
21.	Lighting Panel	Sub lighting panels	These Cables shall be included in Price of item for Lighting fixture	PVC
22.	Lighting Panel	Street Lighting Poles	These Cables shall be included in Price of item for Lighting fixture	PVC
23.	Lighting Panel/ Sub lighting panels	Lighting Fixtures (Outdoor)	These Cables shall be included in Price of item for Lighting fixture	PVC
24.	Bay MB	Equipment	1-4C X 16 mm^2 : For CB 1-4C X 6 mm^2: For Isolator/earths switch 1-2C X 6 : For CT/CVT	PVC
25.	ELDB	Lighting panel	3½C X 70mm^2 :For 765/400kV S/s 3½C X 35mm2 :For 400/220kV S/s	

SECTION 4

GUARANTEED AND TECHNICAL PARTICULARS FOR CIRCUIT BREAKER

Bidder shall furnish the technical parameters for offered circuit breaker in the below mentioned format **after award of contract.**

1. GENERAL

a)	Name of the Manufacturer	……	……
b)	Country of Manufacturer	……	……
c)	Type of Circuit Breaker	……	……
d)	Manufacturer's type designation	……	……
e)	Standard Applicable	……	……
f)	Rated Voltage (kV rms)	……	……
g)	Rated Current	……	……
	i. Under normal condition (A)	……	……
	ii. Under site condition (A)	……	……
h)	Rated frequency (Hz)	……	……
i)	Number of poles	……	……
j)	Whether 3 pole or single pole unit	……	……
k)	Whether All The 3 poles ganged electrically or mechanically	……	……
l)	Whether dead tank or live tank design	……	……
m)	Type of installation	……	……
n)	No. of break per pole	……	……
		……	……
o)	Latching Current		

2. GUARANTEED RATINGS

a)	Rated short circuit breaking current	.....	.....
	i. Symmetrical component at highest system voltage (kA)	.....	.....
	ii. DC Component (%)	.....	.....
	iii. Asymmetrical breaking current at highest system voltage (kA)	.....	.....
b)	Rated Making Capacity	.....	.....
	i. At higher rated voltage (kAp)	.....	.....
	ii. At lower rated voltage (kAp)	.....	.....
		.....	.....
c)	(i) Maximum Total break time under any duty condition for any current upto rated breaking current with limiting conditions of voltage and pressure (ms)		
	ii. Rated break time	.....	.....
d)	Closing time (ms)	.....	.....
		.....	.....
e)	Minimum opening time under any condition with limiting voltage and pressure (ms)		
		.....	.....
f)	Maximum opening time under any condition with limiting voltage and pressure (ms)		
		.....	.....
g)	Maximum close open time under any condition with limiting voltages and pressures (ms)		
h)	First pole to clear factor	.....	.....
i)	Short time current rating (kA) for 1s	.....	.....
j)	Rated operating duty	.....	.....

k) Maximum braking capacity under kilometric faults and rated TRV characteristic (kAp)	……	……
l) Maximum breaking capacity under phase opposition (kAp)	……	……
m) Maximum line charging breaking current with temporary over voltage upto 1.4 p.u. (A)	……	……
n) Maximum over voltage (p.u.) on switching transformer on no load and corresponding charging current	……	……
o) Maximum period between closing of first contact & last contact in a pole (ms)	……	……
p) Maximum pole discrepancy (ms)	……	……
q) Maximum arc duration and corresponding current under lockout pressure	……	……
r) Pre-insertion resistor	…….	
i. Value/ pole (ohms) / with tolerance	……	……
ii. Minimum and maximum duration of insertion per pole (ms)	……	……
iii. Thermal rating for the C-1m-O-CO-2m-C-1m-O-CO for terminal fault considering maximum resistance and	……	……
iv. Thermal rating for the same duty as (iii) above for reclosing against trapped charges	……	……
s) Small fault current breaking capacity (kAp)	……	……
t) Maximum temperature rise for main contacts over design ambient temperature of 50°C	……	……
u) Rated voltage & pick up range for trip coil (V)	……	……
v) Rated voltage & pick up range for closing coil (V)	……	……
w) Rated pressure and limits of pressure of operating mechanism	……	……
x) Rated pressure and limits of pressure of extinguishing medium	……	……
y) Minimum dead time for		
i. Three phase reclosing (ms)	……	……

ii. Single phase reclosing (ms) …… ……

3. DIELECTRIC WITHSTAND OF COMPLETE BREAKER

a) One minute dry & wet power frequency withstand voltage

i. Between live terminal and ground (kVrms) …… ……

ii. Between terminals with breaker contacts open (kV rms) …… ……

b) 1.2/50- micro second impulse withstand test voltage

i. Between live terminals and ground(kVp) …… ……

ii. Between terminals with breaker contacts open (kVp) …… ……

c) 250/2500 micro second switching surge withstand test voltage

i. Between live terminals and ground (kVp) …… ……

ii. Between terminals with breaker contacts open (kVp) …… ……

d) Corona extinction voltage (kV rms) …… ……

e) Maximum radio interference voltage (micro V) at 1.1 Ur/_/3 …… ……

f) Total creepage distance

i. To ground (mm) …… ……

ii. Between terminals (mm) ……

4. OPERATING MECHANISM

a) Type of operating mechanism for

i. Closing …… ……

ii. Opening …… ……

b) Manufacturer's type designation …… ……

c) Normal power consumption (W) at rated voltage of …… ……

i. Trip coil …… ……

ii. Closing coil …… ……

4.1 Spring charged mechanism

a)	Number of close open operations possible after failure of AC supply to motor	……	……
b)	Time required for motor to charge the closing spring (min)	……	……
c)	Whether indication of spring charged condition provided in central control cabinet	……	……

5. TYPE OF BREAKERS

5.1 SF6 Circuit Breakers

a)	Quantity of SF6 per pole (m3) at rated pressure	……	……
b)	Guaranteed max. leakage rate per year	……	……
c)	Rated pressure of SF6 in operating chamber	……	……
d)	Limit of pressure at which breaker operates correctly (kg/ cm2)	……	……
e)	Standard to which SF6 gas complies	……	……
f)	Whether 20% spare SF6 gas stores in unused gas cylinder, included in proposal	……	……
g)	Compacity & filling ration of containers in which SF6 gas would be shipped (m3)	……	……
h)	Whether breakers are dispatched filled with SF6 or required to be filled at site	……	……
i)	Type and make of SF6 pipe coupling used	……	……
j)	Type and make of mandatory maintenance equipment		
	i. SF6 gas filling and evacuation trolley (portable)	……	……
	ii. SF6 gas drying, filling, evacuating equipment and its capacity	……	……
	iii. Operating analyzer type and make	……	……
	iv. SF6 gas leak detector	……	……
k)	Parameters of SF6 gas for initial filling & satisfactory operation		
	i. Density	……	……
	ii. Dielectric strength/ kVmm	……	……
	iii. Acidity (ppm)	……	……
	iv. Water content (ppm)	……	……
	v. Oil content (ppm)	……	……
	vi. Condensation temperature ^{o}C)	……	……
	vii. Resistivity (Ohm-cm)	……	……

l) Whether details of SF6 gas viz test methods, handling etc. enclosed ....

m) Type and material of gasket used to ensure gas tight joints for

i. Metal to metal joints ....

ii. Metal to porcelain joints ....

n) Method of housing SF6 gas compressors and equipment

i. At circuit breaker ....

ii. In control cubicle ....

o) Type and make of

i. Densimeter ....

ii. Pressure gauge ....

p) Densimeter Settings

i. Lockout ....

ii. Alarm ....

q) Minimum time interval between each make/ break operation (ms) ....

5.2 GENERAL

a) Whether OGA drawing enclosed ....

b) Weight of complete 3 phase breaker for foundation design (kg) ....

c) Weight of heaviest part of breaker (kg) ....

d) Impact loading for foundation design ....

e) Seismic level for which breaker is designed ....

f) Minimum safety clearance from earthed objects ....

g) Noise level in (dB) at base of the breaker ....

h) Minimum clearance in air

i. Between live parts (mm) ....

ii. Live parts to earth (mm) ....

iii. Live parts to ground level (mm) ....

6. CONSTRUCTIONAL DETAILS

a) Whether arcing contacts provided ....

b) Type and material of main contacts and arcing contacts ....

c) Contact pressure on main contacts (kg/cm2) ....

d) Contact separation in arcing position (mm) …… ……

e) Contact separation in open position (mm)

   i. Main contacts …… ……

   ii. PIR contacts …… ……

f) Whether pressure relief device for each of the gas chamber of SF6 CB provided …… ……

g) Rate of contact travel

   i. Opening (m/sec) …… ……

   ii. Closing (m/sec) …… ……

h) Whether the making & breaking contacts are hermetically sealed …… ……

i) Type and capacity of device used to obtain uniform voltage distribution between breaks …… ……

j) Overvoltage withstand capability of grading components (kV/mms)

   i. Continuous …… ……

   ii. 10 minutes …… ……

   iii. 1 minute …… ……

   iv. 5 seconds …… ……

k) Number of auxiliary contacts per pole provided for Owner's use …… ……

l) Rated voltage of auxiliary contacts (V) …… ……

m) Current rating of auxiliary contacts

   i. Continuous (A) …… ……

   ii. DC breaking with 20 ms time constant (A) …… ……

n) Whether auxiliary contacts silver plated …… ……

o) Whether support structure included in supply …… ……

p) Height of support structure …… ……

q) Material of support structure …… ……

r) Standard to which the design of support structure conforms …… ……

s) Whether foundation bolts for breakers and cabinets included in scope of supply. …… ……

7. DETAILED LITERATURE

   i. Type test reports as per IEC-56 …… ……

   ii. Factory test report & / or filed test report in case of reactor switching duty …… ……

   iii. Details of operating mechanism …… ……

iv. Drawing of breaker of support structure	……	……
v. Calculations for compressed	……	……
vi. Details of SF6 gas filling	……	……
vii. Details of SF6 gas leak detector	……	……
viii. Precautions in use of SF6 gas	……	……
ix. Leaflets & literature bringing out salient features of equipment offered	……	……
x. Schematic diagrams of switching mechanism for closing resistor showing the duration of insertion alongwith calculation for thermal rating of closing resistors	……	……
xi. Whether drawings/data data furnished as per cl.12 of chapter switchgear (CB)	……	……
xii. Method of checking of voltage distribution devices at site enclosed	……	……
xiii. Details alongwith a complete catalogue of operation analyzer enclosed	……	……
xiv. Data on capabilities of circuit breaker in terms of time and number of operations at duties ranging from 100% fault currents to load currents of the lowest possible value without requiring any maintenance or checks	……	……
xv. Effect of non simultaneity between contact within a pole or between poles and also show how it is covered in the guaranteed rated break time.	……	……
xvi. Details and type of filters used in interrupter assembly and also the operating experience with such filters	……	……
xvii. Curves supported by test data indicating the opening time under close open operation with combined variation of trip coil voltage & pneumatic/ hydraulic pressure	……	……
xviii. All duty requirements specified alongwith adequate test reports	……	……

CONTROL CABINETS

1. Manufacturer's Name	……	……
2. Indoor/ Outdoor application	……	……
3. Design ambient air temperature (deg. C)	……	……
4. Standards applicable	……	……
5. Thickness of sheet steel (mm) and whether cold	……	……

rolled or hot rolled		
6. Degree of protection provided	……	……
7. Bill of material for all the equipment mounted on control cabinet giving the following details	……	……
a) Make and type	……	……
b) Applicable Standard	……	……
c) Voltage rating	……	……
d) Current rating	……	……
e) Duty class, if applicable	……	……
f) Manufacturers catalogue No.	……	……
g) Total heat load of cabinet (for purpose of ventilation requirement)	……	……
8. Colour of finish paint IS:5	……	……
a) Outside	……	……
b) Inside	……	……
9. Control Wiring	……	……
(a) Size of conductor	……	……
i. For CT circuits	……	……
ii. For other circuits	……	……
b) Conductor Solid/ Standard	……	……
c) Number of Strands/ conductor	……	……
10. Terminal Blocks	……	……
(a) Make & type	……	……
b) Current rating	……	……
i) Power terminals (A)	……	……
ii) Other terminals (A)		
11. Space Heater Rating at 240 V AC	……	……
12. Control cabinet drawing showing the following		
a) Outline dimensions, floor openings, floor/wall/ pedestal fixing arrangements, weights etc.	……	……
b) Front view, inside view showing the mounting arrangement of various equipment	……	……
13. Schematic/ Wiring diagram of control cabinet enclosed	……	……
14. Interconnection drawing showing cable, connections to the control cabinet enclosed	……	……
15. Type test report to verify design of protection enclosed	……	……

16. Details of terminal rows:

i) Whether arranged vertical or horizontal	……	……
ii) Clearance from adjacent components	……	……
iii) Distance between rows	……	……
iv) Whether transparent protection cover provided	……	……

BUSHING/SUPPORT INSULATOR

1.Manufacturer's Name	……	……
2.Type	……	……
3.Applicable Standards		
i) Height	……	……
ii. Diameter (Top)	……	……
iii. Diameter (Bottom)	……	……
4.Total Creepage distance (mm)	……	……
5.Rated voltage (kV)	……	……
6.Power frequency withstand voltage for 1 Min. (kVrms) dry and wet	……	……
7. 1.2/50 micro sec. Impulse withstand voltage (kVp)	……	……
8. 250/2500 micro sec. Switching impulse withstand voltage (kVp) dry and wet	……	……
9.Corona Extinction voltage (kV)	……	……
10.Weight (kg)	……	……
11. Max. Allowable span (mm)	……	……
12. Cantilever Strength (kg)	……	……
13. OGA drawing enclosed	……	……

ANNEXURE – A

SCHEDULE OF TECHNICAL DEVIATIONS

Bidder shall list below all technical deviation clause wise w.r.t. tender specifications:

S.No.	Section/ Page No.	Clause No.	Deviation	Reason / Justification

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: Tenderer's Stamp & Signature

SECTION-5

Checklist

1	**Technical Qualifying Requirement**		
1.1	The bidder to furnish relevant documents for meeting the qualifying requirement. Performance certificates shall be submitted in English. Translated pages should be attested by the ultimate customer, if attested only by the bidder it shall be notarized.	Confirmed	Yes/No
1.2	The bidder's scope includes supply and services such as Supervision of installation, Testing and commissioning.	Confirmed	Yes/No
2	**Un-priced BOQ**		
2.1	Confirm that all items have been quoted separately. (If any item has not been quoted, the same shall be specifically brought out with technical reasons thereof) Record the same in schedule of technical deviations.	Confirmed	Yes/No
3	**Technical**		
3.1	Minimum Number of auxiliary contacts on each Circuit Breaker - Besides requirement of technical specification, the manufacturer shall wire up 10 NO + 10 NC contacts of each phase/ pole exclusively for purchaser's use and shall be wired up to common marshalling box of respective CB.	Confirmed	Yes/No
4	**Technical Deviations**		
4.1	Confirm that the Complete systems have been offered as per the requirements of Technical Specification and Nil Deviation sheet, Annex-A has been submitted. Deviations mentioned elsewhere in the bid will not be considered.	Confirmed	Yes/No
	General		
5	All equipment being supplied shall conform to Guaranteed Technical Particulars as per technical specification and applicable IS / IEC	Confirmed	Yes/No
6	Powergrid standard approval on 420kV, 245kV, 145kV, 72.5kV Circuit Breaker drawings.	Confirmed	Yes/No
7	Type test Reports (Already approved by Power grid and not older than 10 years from the date as mentioned in section-1)	Confirmed	Yes/No
8	MQP available (Approved with validity date)	Confirmed	Yes/No
9	Compliance to clause 7 (Type test) of section-1 of this specification.	Confirmed	Yes/No
10	Performance Certificate as per TQR	Enclosed	Yes/No

Date:
Contact Details: Bidder's Stamp & Signature

UNPRICED FORMAT

Tender Inviting Authority: BHEL, TBG Noida

TENDER DESCRIPTION: SUPPLY AND SUPERVISION OF ETC OF CIRCUIT BREAKERS (765kV CB, PACKAGE-I) FOR VARIOUS POWERGRID PROJECTS.

Enquiry/NIT No:

Name of the Bidder/ Bidding Firm / Company :	

PRICE SCHEDULE (BoQ1 is applicable only for Indian Bidders)

(This BOQ template must not be modified/replaced by the bidder and the same should be uploaded after filling the relevent columns, else the bidder is liable to be rejected for this tender. Bidders are allowed to enter the Bidder Name and Values only)

NUMBER #	TEXT #	TEXT #	NUMBER #	TEXT #	TEXT	NUMBER #	NUMBER	NUMBER	NUMBER	NUMBER	NUMBER	NUMBER #	NUMBER #	NUMBER #
Sl. No.	Item Description	Item Code / Make	Quantity	Units	Material Code	Unit Ex-Works RATE In Figures To be entered by the Bidder in Rs. P	GST on Ex-Works (in Percentage)	GST Amount (Unit Rate*Quantity* GST) Rs. P	Unit Freight & Insurance Charges in Rs. P	GST on F&I (in Percentage)	GST Amount on F&I (Unit Rate*Quantity*GST) Rs. P	HSN / SAC Code	TOTAL AMOUNT With Taxes	TOTAL Ex-Works + F & I AMOUNT including GST in Rs. P
1.00	2	3	4	5	6	7	8	9	10	11	12	13	14	15
1.01	SUPPLY- CIRCUIT BREAKER : 765KV, 50KA FOR 1S, 25MM/KV CREEPAGE, 3150A 3 PHASE CIRCUIT BREAKER WITHOUT PIR WITH CONTROL SWITCHING CAPABILITY ALONGWITH SUPPORT STRUCTURE, INTERPOLE CABLES, OPERATING MECHANISM, CONTROL BOXES AND ALL ACCESSORIES COMPLETE IN ALL RESPECT	Mandsaur (New)-Supply-1	5	NO	TB9067523006	QUOTED	QUOTED	QUOTED	QUOTED	QUOTED	QUOTED		QUOTED	QUOTED
1.02	SUPPLY- CIRCUIT BREAKER : 765KV, 50KA FOR 1S, 25MM/KV CREEPAGE, 3150A 3 PHASE CIRCUIT BREAKER WITH PIR WITH CONTROL SWITCHING CAPABILITY ALONGWITH SUPPORT STRUCTURE, INTERPOLE CABLES, OPERATING MECHANISM, CONTROL BOXES AND ALL ACCESSORIES COMPLETE IN ALL RESPECT	Mandsaur (New)-Supply-2	7	NO	TB9067521475	QUOTED	QUOTED	QUOTED	QUOTED	QUOTED	QUOTED		QUOTED	QUOTED
1.03	SUPPLY- CIRCUIT BREAKER : 765KV, 50KA FOR 1S, 25MM/KV CREEPAGE, 3150A 3 PHASE CIRCUIT BREAKER WITHOUT PIR WITH CONTROL SWITCHING CAPABILITY ALONGWITH SUPPORT STRUCTURE, INTERPOLE CABLES, OPERATING MECHANISM, CONTROL BOXES AND ALL ACCESSORIES COMPLETE IN ALL RESPECT SUITABLE FOR 1-PHASE REACTOR SWITCHING	Mandsaur (New)-Supply-3	2	NO	TB9067521491	QUOTED	QUOTED	QUOTED	QUOTED	QUOTED	QUOTED		QUOTED	QUOTED

Sl. No.	Item Description	Item Code / Make	Quantity	Units	Material Code	Unit Ex-Works RATE In Figures To be entered by the Bidder in Rs. P	GST on Ex-Works (in Percentage)	GST Amount (Unit Rate*Quantity* GST) Rs. P	Unit Freight & Insurance Charges in Rs. P	GST on F&I (in Percentage)	GST Amount on F&I (Unit Rate*Quantity*GST) Rs. P	HSN / SAC Code	TOTAL AMOUNT With Taxes	TOTAL Ex-Works + F & I AMOUNT including GST in Rs. P
1.00	2	3	4	5	6	7	8	9	10	11	12	13	14	15
1.04	SUPPLY- CIRCUIT BREAKER : 765KV, 50KA FOR 1S, 25MM/KV CREEPAGE, 3150A 1 PHASE CIRCUIT BREAKER WITHOUT PIR WITH CONTROL SWITCHING CAPABILITY ALONGWITH SUPPORT STRUCTURE, INTERPOLE CABLES, OPERATING MECHANISM, CONTROL BOXES AND ALL ACCESSORIES COMPLETE IN ALL RESPECT SUITABLE FOR 1-PHASE REACTOR SWITCHING	Mandsaur (New)-Supply-4	1	NO	TB9067521481	QUOTED	QUOTED	QUOTED	QUOTED	QUOTED	QUOTED		QUOTED	QUOTED
1.05	SUPPLY- CIRCUIT BREAKER : 765KV, CONTROLLED SWITCHING DEVICE FOR 3-PH CIRCUIT BREAKER	Mandsaur (New)-Supply-5	10	NO	TB9067001324	QUOTED	QUOTED	QUOTED	QUOTED	QUOTED	QUOTED		QUOTED	QUOTED
1.06	SUPPLY- CIRCUIT BREAKER : SPECIAL CABLES FOR CB / CSD / RP INTERFACING. MODE OF MEASUREMENT SHALL BE CABLE-TRENCH RUNNING LENGTH FROM CIRCUIT BREAKER TO CSD/ RELAY PANEL	Mandsaur (New)-Supply-6	2500	MTR	TB9060001333	QUOTED	QUOTED	QUOTED	QUOTED	QUOTED	QUOTED		QUOTED	QUOTED
1.07	SUPPLY- CIRCUIT BREAKER : 765KV, FOUNDATION BOLTS FOR CIRCUIT BREAKER, PLATFORM AND LADDER	Mandsaur (New)-Supply-7	43	SET	TB9067001312	QUOTED	QUOTED	QUOTED	QUOTED	QUOTED	QUOTED		QUOTED	QUOTED
1.08	SUPPLY- CIRCUIT BREAKER : TRANSDUCERS / FIXTURES REQUIRED FOR TRAVEL MEASUREMENT OF COMPLETE 3-PHASE CB	Mandsaur (New)-Supply-8	1	SET	TB9060001342	QUOTED	QUOTED	QUOTED	QUOTED	QUOTED	QUOTED		QUOTED	QUOTED
1.09	SUPPLY- CIRCUIT BREAKER : SF6 GAS FILLING ADOPTER, INCLUDING COUPLING, REGULATOR, CONNECTING HOSE PIPE UP TO GROUND LEVEL	Mandsaur (New)-Supply-9	1	LOT	TB9060001356	QUOTED	QUOTED	QUOTED	QUOTED	QUOTED	QUOTED		QUOTED	QUOTED
1.10	SERVICES- CIRCUIT BREAKER : 765KV, SUPERVISION OF ERECTION, TESTING AND COMMISSIONING OF CIRCUIT BREAKER	Mandsaur (New)-Services-1	14	NO	TB3067001366	QUOTED	QUOTED	QUOTED	Not Applicable	Not Applicable	Not Applicable		QUOTED	QUOTED
1.11	SERVICES- CIRCUIT BREAKER : 765KV, SUPERVISION OF ERECTION, TESTING AND COMMISSIONING OF 1 PHASE CIRCUIT BREAKER WITHOUT PIR SUITABLE FOR 1-PHASE REACTOR SWITCHING	Mandsaur (New)-Services-2	1	NO	TB3067001521	QUOTED	QUOTED	QUOTED	Not Applicable	Not Applicable	Not Applicable		QUOTED	QUOTED
1.12	SERVICES- CIRCUIT BREAKER : 765KV, SUPERVISION OF ERECTION, TESTING AND COMMISSIONING OF CONTROLLED SWITCHING DEVICE FOR 3 PHASE CIRCUIT BREAKER	Mandsaur (New)-Services-3	10	NO	TB3067001536	QUOTED	QUOTED	QUOTED	Not Applicable	Not Applicable	Not Applicable		QUOTED	QUOTED

Sl. No.	Item Description	Item Code / Make	Quantity	Units	Material Code	Unit Ex-Works RATE In Figures To be entered by the Bidder in Rs. P	GST on Ex-Works (in Percentage)	GST Amount (Unit Rate*Quantity* GST) Rs. P	Unit Freight & Insurance Charges in Rs. P	GST on F&I (in Percentage)	GST Amount on F&I (Unit Rate*Quantity*GST) Rs. P	HSN / SAC Code	TOTAL AMOUNT With Taxes	TOTAL Ex-Works + F & I AMOUNT including GST in Rs. P
1.00	2	3	4	5	6	7	8	9	10	11	12	13	14	15
2.01	SUPPLY- CIRCUIT BREAKER : 765KV, 50KA FOR 1S, 25MM/KV CREEPAGE, 3150A 3 PHASE CIRCUIT BREAKER WITH PIR WITH CONTROL SWITCHING CAPABILITY ALONGWITH SUPPORT STRUCTURE, INTERPOLE CABLES, OPERATING MECHANISM, CONTROL BOXES AND ALL ACCESSORIES COMPLETE IN ALL RESPECT	Indore (extn)-Supply-1	4	NO	TB9067521475	QUOTED	QUOTED	QUOTED	QUOTED	QUOTED	QUOTED		QUOTED	QUOTED
2.02	SUPPLY- CIRCUIT BREAKER : 765KV, CONTROLLED SWITCHING DEVICE FOR 3-PH CIRCUIT BREAKER	Indore (extn)-Supply-2	2	NO	TB9067001324	QUOTED	QUOTED	QUOTED	QUOTED	QUOTED	QUOTED		QUOTED	QUOTED
2.03	SUPPLY- CIRCUIT BREAKER : SPECIAL CABLES FOR CB / CSD / RP INTERFACING. MODE OF MEASUREMENT SHALL BE CABLE-TRENCH RUNNING LENGTH FROM CIRCUIT BREAKER TO CSD/ RELAY PANEL	Indore (extn)-Supply-3	500	MTR	TB9060001333	QUOTED	QUOTED	QUOTED	QUOTED	QUOTED	QUOTED		QUOTED	QUOTED
2.04	SUPPLY- CIRCUIT BREAKER : 765KV, FOUNDATION BOLTS FOR CIRCUIT BREAKER, PLATFORM AND LADDER	Indore (extn)-Supply-4	12	SET	TB9067001312	QUOTED	QUOTED	QUOTED	QUOTED	QUOTED	QUOTED		QUOTED	QUOTED
2.05	SUPPLY- CIRCUIT BREAKER : TRANSDUCERS / FIXTURES REQUIRED FOR TRAVEL MEASUREMENT OF COMPLETE 3-PHASE CB	Indore (extn)-Supply-5	1	SET	TB9060001342	QUOTED	QUOTED	QUOTED	QUOTED	QUOTED	QUOTED		QUOTED	QUOTED
2.06	SUPPLY- CIRCUIT BREAKER : SF6 GAS FILLING ADOPTER, INCLUDING COUPLING, REGULATOR, CONNECTING HOSE PIPE UP TO GROUND LEVEL	Indore (extn)-Supply-6	1	LOT	TB9060001356	QUOTED	QUOTED	QUOTED	QUOTED	QUOTED	QUOTED		QUOTED	QUOTED
2.07	SERVICES- CIRCUIT BREAKER : 765KV, SUPERVISION OF ERECTION, TESTING AND COMMISSIONING OF CIRCUIT BREAKER	Indore (extn)-Services-1	4	NO	TB3067001366	QUOTED	QUOTED	QUOTED	Not Applicable	Not Applicable	Not Applicable		QUOTED	QUOTED
2.08	SERVICES- CIRCUIT BREAKER : 765KV, SUPERVISION OF ERECTION, TESTING AND COMMISSIONING OF CONTROLLED SWITCHING DEVICE FOR 3 PHASE CIRCUIT BREAKER	Indore (extn)-Services-2	2	NO	TB3067001536	QUOTED	QUOTED	QUOTED	Not Applicable	Not Applicable	Not Applicable		QUOTED	QUOTED
3.01	SUPPLY- CIRCUIT BREAKER : 765KV, 50KA FOR 1S, 25MM/KV CREEPAGE, 3150A 3 PHASE CIRCUIT BREAKER WITHOUT PIR WITH CONTROL SWITCHING CAPABILITY ALONGWITH SUPPORT STRUCTURE, INTERPOLE CABLES, OPERATING MECHANISM, CONTROL BOXES AND ALL ACCESSORIES COMPLETE IN ALL RESPECT	Barmer-I (new)-Supply-1	7	NO	TB9067523006	QUOTED	QUOTED	QUOTED	QUOTED	QUOTED	QUOTED		QUOTED	QUOTED

Sl. No.	Item Description	Item Code / Make	Quantity	Units	Material Code	Unit Ex-Works RATE In Figures To be entered by the Bidder in Rs. P	GST on Ex-Works (in Percentage)	GST Amount (Unit Rate*Quantity* GST) Rs. P	Unit Freight & Insurance Charges in Rs. P	GST on F&I (in Percentage)	GST Amount on F&I (Unit Rate*Quantity*GST) Rs. P	HSN / SAC Code	TOTAL AMOUNT With Taxes	TOTAL Ex-Works + F & I AMOUNT including GST in Rs. P
1.00	2	3	4	5	6	7	8	9	10	11	12	13	14	15
3.02	SUPPLY- CIRCUIT BREAKER : 765KV, 50KA FOR 1S, 25MM/KV CREEPAGE, 3150A 3 PHASE CIRCUIT BREAKER WITH PIR WITH CONTROL SWITCHING CAPABILITY ALONGWITH SUPPORT STRUCTURE, INTERPOLE CABLES, OPERATING MECHANISM, CONTROL BOXES AND ALL ACCESSORIES COMPLETE IN ALL RESPECT	Barmer-I (new)-Supply-2	4	NO	TB9067521475	**QUOTED**	**QUOTED**	**QUOTED**	**QUOTED**	**QUOTED**	**QUOTED**		**QUOTED**	**QUOTED**
3.03	SUPPLY- CIRCUIT BREAKER : 765KV, 50KA FOR 1S, 25MM/KV CREEPAGE, 3150A 3 PHASE CIRCUIT BREAKER WITHOUT PIR WITH CONTROL SWITCHING CAPABILITY ALONGWITH SUPPORT STRUCTURE, INTERPOLE CABLES, OPERATING MECHANISM, CONTROL BOXES AND ALL ACCESSORIES COMPLETE IN ALL RESPECT SUITABLE FOR 1-PHASE REACTOR SWITCHING	Barmer-I (new)-Supply-3	2	NO	TB9067521491	**QUOTED**	**QUOTED**	**QUOTED**	**QUOTED**	**QUOTED**	**QUOTED**		**QUOTED**	**QUOTED**
3.04	SUPPLY- CIRCUIT BREAKER : 765KV, 50KA FOR 1S, 25MM/KV CREEPAGE, 3150A 1 PHASE CIRCUIT BREAKER WITHOUT PIR WITH CONTROL SWITCHING CAPABILITY ALONGWITH SUPPORT STRUCTURE, INTERPOLE CABLES, OPERATING MECHANISM, CONTROL BOXES AND ALL ACCESSORIES COMPLETE IN ALL RESPECT SUITABLE FOR 1-PHASE REACTOR SWITCHING	Barmer-I (new)-Supply-4	1	NO	TB9067521481	**QUOTED**	**QUOTED**	**QUOTED**	**QUOTED**	**QUOTED**	**QUOTED**		**QUOTED**	**QUOTED**
3.05	SUPPLY- CIRCUIT BREAKER : 765KV, CONTROLLED SWITCHING DEVICE FOR 3-PH CIRCUIT BREAKER	Barmer-I (new)-Supply-5	11	NO	TB9067001324	**QUOTED**	**QUOTED**	**QUOTED**	**QUOTED**	**QUOTED**	**QUOTED**		**QUOTED**	**QUOTED**
3.06	SUPPLY- CIRCUIT BREAKER : SPECIAL CABLES FOR CB / CSD / RP INTERFACING. MODE OF MEASUREMENT SHALL BE CABLE-TRENCH RUNNING LENGTH FROM CIRCUIT BREAKER TO CSD/ RELAY PANEL	Barmer-I (new)-Supply-6	2750	MTR	TB9060001333	**QUOTED**	**QUOTED**	**QUOTED**	**QUOTED**	**QUOTED**	**QUOTED**		**QUOTED**	**QUOTED**
3.07	SUPPLY- CIRCUIT BREAKER : 765KV, FOUNDATION BOLTS FOR CIRCUIT BREAKER, PLATFORM AND LADDER	Barmer-I (new)-Supply-7	40	SET	TB9067001312	**QUOTED**	**QUOTED**	**QUOTED**	**QUOTED**	**QUOTED**	**QUOTED**		**QUOTED**	**QUOTED**
3.08	SUPPLY- CIRCUIT BREAKER : TRANSDUCERS / FIXTURES REQUIRED FOR TRAVEL MEASUREMENT OF COMPLETE 3-PHASE CB	Barmer-I (new)-Supply-8	1	SET	TB9060001342	**QUOTED**	**QUOTED**	**QUOTED**	**QUOTED**	**QUOTED**	**QUOTED**		**QUOTED**	**QUOTED**

Sl. No.	Item Description	Item Code / Make	Quantity	Units	Material Code	Unit Ex-Works RATE In Figures To be entered by the Bidder in Rs. P	GST on Ex-Works (in Percentage)	GST Amount (Unit Rate*Quantity* GST) Rs. P	Unit Freight & Insurance Charges in Rs. P	GST on F&I (in Percentage)	GST Amount on F&I (Unit Rate*Quantity*GST) Rs. P	HSN / SAC Code	TOTAL AMOUNT With Taxes	TOTAL Ex-Works + F & I AMOUNT including GST in Rs. P
1.00	2	3	4	5	6	7	8	9	10	11	12	13	14	15
3.09	SUPPLY- CIRCUIT BREAKER : SF6 GAS FILLING ADOPTER, INCLUDING COUPLING, REGULATOR, CONNECTING HOSE PIPE UP TO GROUND LEVEL	Barmer-I (new)-Supply-9	1	LOT	TB9060001356	QUOTED	QUOTED	QUOTED	QUOTED	QUOTED	QUOTED		QUOTED	QUOTED
3.10	SPARES- CIRCUIT BREAKER : 765KV, 50KA FOR 1S, 25MM/KV CREEPAGE, ONE COMPLETE POLE OF 3150A CB WITHOUT CLOSING RESISTOR, WITH GRADING CAPACITOR (IF APPLICABLE), WITH POLE COLUMN, INTERRUPTER, OPERATING MECHANISM, MARSHALING BOX, CORONA RINGS WITHOUT SUPPORT STRUCTURE.	Barmer-I (new)-Supply-10	1	NO	TB8067522983	QUOTED	QUOTED	QUOTED	QUOTED	QUOTED	QUOTED		QUOTED	QUOTED
3.11	SPARES- CIRCUIT BREAKER : 765KV, 50KA FOR 1S, 25MM/KV CREEPAGE, ONE COMPLETE POLE OF 3150A CB WITH CLOSING RESISTOR, WITH GRADING CAPACITOR (IF APPLICABLE), WITH POLE COLUMN, INTERRUPTER, OPERATING MECHANISM, MARSHALING BOX, CORONA RINGS WITHOUT SUPPORT STRUCTURE.	Barmer-I (new)-Supply-11	1	NO	TB8067522996	QUOTED	QUOTED	QUOTED	QUOTED	QUOTED	QUOTED		QUOTED	QUOTED
3.12	SPARES- CIRCUIT BREAKER : 765KV, GRADING CAPACITORS	Barmer-I (new)-Supply-12	2	NO	TB8067000683	QUOTED	QUOTED	QUOTED	QUOTED	QUOTED	QUOTED		QUOTED	QUOTED
3.13	SPARES- CIRCUIT BREAKER : 765KV, RUBBER GASKETS, 'O' RINGS AND SEALS	Barmer-I (new)-Supply-13	1	SET	TB8067001872	QUOTED	QUOTED	QUOTED	QUOTED	QUOTED	QUOTED		QUOTED	QUOTED
3.14	SPARES- CIRCUIT BREAKER : 765KV, TRIP COILS WITH RESISTOR	Barmer-I (new)-Supply-14	2	SET	TB8067000624	QUOTED	QUOTED	QUOTED	QUOTED	QUOTED	QUOTED		QUOTED	QUOTED
3.15	SPARES- CIRCUIT BREAKER : 765KV, CLOSING COILS WITH RESISTOR	Barmer-I (new)-Supply-15	2	SET	TB8067000636	QUOTED	QUOTED	QUOTED	QUOTED	QUOTED	QUOTED		QUOTED	QUOTED
3.16	SPARES- CIRCUIT BREAKER : 765KV, TERMINAL PAD AND CONNECTOR	Barmer-I (new)-Supply-16	2	SET	TB8067003254	QUOTED	QUOTED	QUOTED	QUOTED	QUOTED	QUOTED		QUOTED	QUOTED
3.17	SPARES- CIRCUIT BREAKER : 765KV, MOLECULAR FILTER	Barmer-I (new)-Supply-17	2	NO	TB8067000653	QUOTED	QUOTED	QUOTED	QUOTED	QUOTED	QUOTED		QUOTED	QUOTED
3.18	SPARES- CIRCUIT BREAKER : 765KV, CORONA RINGS	Barmer-I (new)-Supply-18	1	NO	TB8067000671	QUOTED	QUOTED	QUOTED	QUOTED	QUOTED	QUOTED		QUOTED	QUOTED
3.19	SPARES- CIRCUIT BREAKER : 765KV, RELAY POWER CONTACTORS, SWITCH FUSE UNITS, LIMIT SWITCHES, PUSH BUTTON, TIMERS & MCB ETC	Barmer-I (new)-Supply-19	1	SET	TB8067001383	QUOTED	QUOTED	QUOTED	QUOTED	QUOTED	QUOTED		QUOTED	QUOTED
3.20	SPARES- CIRCUIT BREAKER : 765KV, PRESSURE SWITCH OF EACH TYPE	Barmer-I (new)-Supply-20	1	SET	TB8067003263	QUOTED	QUOTED	QUOTED	QUOTED	QUOTED	QUOTED		QUOTED	QUOTED

Sl. No.	Item Description	Item Code / Make	Quantity	Units	Material Code	Unit Ex-Works RATE In Figures To be entered by the Bidder in Rs. P	GST on Ex-Works (in Percentage)	GST Amount (Unit Rate*Quantity* GST) Rs. P	Unit Freight & Insurance Charges in Rs. P	GST on F&I (in Percentage)	GST Amount on F&I (Unit Rate*Quantity*GST) Rs. P	HSN / SAC Code	TOTAL AMOUNT With Taxes	TOTAL Ex-Works + F & I AMOUNT including GST in Rs. P
1.00	2	3	4	5	6	7	8	9	10	11	12	13	14	15
3.21	SPARES- CIRCUIT BREAKER : 765KV, AUXILIARY SWITCH ASSEMBLY	Barmer-I (new)-Supply-21	1	SET	TB8067000893	QUOTED	QUOTED	QUOTED	QUOTED	QUOTED	QUOTED		QUOTED	QUOTED
3.22	SPARES- CIRCUIT BREAKER : 765KV, OPERATION COUNTER	Barmer-I (new)-Supply-22	1	NO	TB8067000902	QUOTED	QUOTED	QUOTED	QUOTED	QUOTED	QUOTED		QUOTED	QUOTED
3.23	SPARES- CIRCUIT BREAKER : 765KV, COMPLETE DRIVE MECHANISM	Barmer-I (new)-Supply-23	1	SET	TB8067001135	QUOTED	QUOTED	QUOTED	QUOTED	QUOTED	QUOTED		QUOTED	QUOTED
3.24	SPARES- CIRCUIT BREAKER : 765KV, SF6 GAS (EQUIVALENT TO 2 POLES)	Barmer-I (new)-Supply-24	1	LOT	TB8067002583	QUOTED	QUOTED	QUOTED	QUOTED	QUOTED	QUOTED		QUOTED	QUOTED
3.25	SERVICES- CIRCUIT BREAKER : 765KV, SUPERVISION OF ERECTION, TESTING AND COMMISSIONING OF CIRCUIT BREAKER	Barmer-I (new)-Services-1	13	NO	TB3067001366	QUOTED	QUOTED	QUOTED	Not Applicable	Not Applicable	Not Applicable		QUOTED	QUOTED
3.26	SERVICES- CIRCUIT BREAKER : 765KV, SUPERVISION OF ERECTION, TESTING AND COMMISSIONING OF 1 PHASE CIRCUIT BREAKER WITHOUT PIR SUITABLE FOR 1-PHASE REACTOR SWITCHING	Barmer-I (new)-Services-2	1	NO	TB3067001521	QUOTED	QUOTED	QUOTED	Not Applicable	Not Applicable	Not Applicable		QUOTED	QUOTED
3.27	SERVICES- CIRCUIT BREAKER : 765KV, SUPERVISION OF ERECTION, TESTING AND COMMISSIONING OF CONTROLLED SWITCHING DEVICE FOR 3 PHASE CIRCUIT BREAKER	Barmer-I (new)-Services-3	11	NO	TB3067001536	QUOTED	QUOTED	QUOTED	Not Applicable	Not Applicable	Not Applicable		QUOTED	QUOTED
4.01	SUPPLY- CIRCUIT BREAKER : 765KV, 50KA FOR 1S, 25MM/KV CREEPAGE, 3150A 3 PHASE CIRCUIT BREAKER WITH PIR WITH CONTROL SWITCHING CAPABILITY ALONGWITH SUPPORT STRUCTURE, INTERPOLE CABLES, OPERATING MECHANISM, CONTROL BOXES AND ALL ACCESSORIES COMPLETE IN ALL RESPECT	Sirohi (extn)-Supply-1	3	NO	TB9067521475	QUOTED	QUOTED	QUOTED	QUOTED	QUOTED	QUOTED		QUOTED	QUOTED
4.02	SUPPLY- CIRCUIT BREAKER : 765KV, 50KA FOR 1S, 25MM/KV CREEPAGE, 3150A 3 PHASE CIRCUIT BREAKER WITHOUT PIR WITH CONTROL SWITCHING CAPABILITY ALONGWITH SUPPORT STRUCTURE, INTERPOLE CABLES, OPERATING MECHANISM, CONTROL BOXES AND ALL ACCESSORIES COMPLETE IN ALL RESPECT SUITABLE FOR 1-PHASE REACTOR SWITCHING	Sirohi (extn)-Supply-2	2	NO	TB9067521491	QUOTED	QUOTED	QUOTED	QUOTED	QUOTED	QUOTED		QUOTED	QUOTED

Sl. No.	Item Description	Item Code / Make	Quantity	Units	Material Code	Unit Ex-Works RATE In Figures To be entered by the Bidder in Rs. P	GST on Ex-Works (in Percentage)	GST Amount (Unit Rate*Quantity* GST) Rs. P	Unit Freight & Insurance Charges in Rs. P	GST on F&I (in Percentage)	GST Amount on F&I (Unit Rate*Quantity*GST) Rs. P	HSN / SAC Code	TOTAL AMOUNT With Taxes	TOTAL Ex-Works + F & I AMOUNT including GST in Rs. P
1.00	2	3	4	5	6	7	8	9	10	11	12	13	14	15
4.03	SUPPLY- CIRCUIT BREAKER : 765KV, 50KA FOR 1S, 25MM/KV CREEPAGE, 3150A 1 PHASE CIRCUIT BREAKER WITHOUT PIR WITH CONTROL SWITCHING CAPABILITY ALONGWITH SUPPORT STRUCTURE, INTERPOLE CABLES, OPERATING MECHANISM, CONTROL BOXES AND ALL ACCESSORIES COMPLETE IN ALL RESPECT SUITABLE FOR 1-PHASE REACTOR SWITCHING	Sirohi (extn)-Supply-3	1	NO	TB9067521481	QUOTED	QUOTED	QUOTED	QUOTED	QUOTED	QUOTED		QUOTED	QUOTED
4.04	SUPPLY- CIRCUIT BREAKER : 765KV, CONTROLLED SWITCHING DEVICE FOR 3-PH CIRCUIT BREAKER	Sirohi (extn)-Supply-4	2	NO	TB9067001324	QUOTED	QUOTED	QUOTED	QUOTED	QUOTED	QUOTED		QUOTED	QUOTED
4.05	SUPPLY- CIRCUIT BREAKER : SPECIAL CABLES FOR CB / CSD / RP INTERFACING. MODE OF MEASUREMENT SHALL BE CABLE-TRENCH RUNNING LENGTH FROM CIRCUIT BREAKER TO CSD/ RELAY PANEL	Sirohi (extn)-Supply-5	500	MTR	TB9060001333	QUOTED	QUOTED	QUOTED	QUOTED	QUOTED	QUOTED		QUOTED	QUOTED
4.06	SUPPLY- CIRCUIT BREAKER : 765KV, FOUNDATION BOLTS FOR CIRCUIT BREAKER, PLATFORM AND LADDER	Sirohi (extn)-Supply-6	16	SET	TB9067001312	QUOTED	QUOTED	QUOTED	QUOTED	QUOTED	QUOTED		QUOTED	QUOTED
4.07	SUPPLY- CIRCUIT BREAKER : TRANSDUCERS / FIXTURES REQUIRED FOR TRAVEL MEASUREMENT OF COMPLETE 3-PHASE CB	Sirohi (extn)-Supply-7	1	LOT	TB9060001342	QUOTED	QUOTED	QUOTED	QUOTED	QUOTED	QUOTED		QUOTED	QUOTED
4.08	SUPPLY- CIRCUIT BREAKER : SF6 GAS FILLING ADOPTER, INCLUDING COUPLING, REGULATOR, CONNECTING HOSE PIPE UP TO GROUND LEVEL	Sirohi (extn)-Supply-8	1	LOT	TB9060001356	QUOTED	QUOTED	QUOTED	QUOTED	QUOTED	QUOTED		QUOTED	QUOTED
4.09	SERVICES- CIRCUIT BREAKER : 765KV, SUPERVISION OF ERECTION, TESTING AND COMMISSIONING OF CIRCUIT BREAKER	Sirohi (extn)-Services-1	5	NO	TB3067001366	QUOTED	QUOTED	QUOTED	Not Applicable	Not Applicable	Not Applicable		QUOTED	QUOTED
4.10	SERVICES- CIRCUIT BREAKER : 765KV, SUPERVISION OF ERECTION, TESTING AND COMMISSIONING OF 1 PHASE CIRCUIT BREAKER WITHOUT PIR SUITABLE FOR 1-PHASE REACTOR SWITCHING	Sirohi (extn)-Services-2	1	NO	TB3067001521	QUOTED	QUOTED	QUOTED	Not Applicable	Not Applicable	Not Applicable		QUOTED	QUOTED
4.11	SERVICES- CIRCUIT BREAKER : 765KV, SUPERVISION OF ERECTION, TESTING AND COMMISSIONING OF CONTROLLED SWITCHING DEVICE FOR 3 PHASE CIRCUIT BREAKER	Sirohi (extn)-Services-3	2	NO	TB3067001536	QUOTED	QUOTED	QUOTED	Not Applicable	Not Applicable	Not Applicable		QUOTED	QUOTED

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1.00	2	3	4	5	6	7	8	9	10	11	12	13	14	15
5.01	SUPPLY- CIRCUIT BREAKER : 765KV, 50KA FOR 1S, 25MM/KV CREEPAGE, 3150A 3 PHASE CIRCUIT BREAKER WITHOUT PIR WITH CONTROL SWITCHING CAPABILITY ALONGWITH SUPPORT STRUCTURE, INTERPOLE CABLES, OPERATING MECHANISM, CONTROL BOXES AND ALL ACCESSORIES COMPLETE IN ALL RESPECT	Kurawar (New)-Supply-1	8	NO	TB9067523006	QUOTED	QUOTED	QUOTED	QUOTED	QUOTED	QUOTED		QUOTED	QUOTED
5.02	SUPPLY- CIRCUIT BREAKER : 765KV, 50KA FOR 1S, 25MM/KV CREEPAGE, 3150A 3 PHASE CIRCUIT BREAKER WITH PIR WITH CONTROL SWITCHING CAPABILITY ALONGWITH SUPPORT STRUCTURE, INTERPOLE CABLES, OPERATING MECHANISM, CONTROL BOXES AND ALL ACCESSORIES COMPLETE IN ALL RESPECT	Kurawar (New)-Supply-2	4	NO	TB9067521475	QUOTED	QUOTED	QUOTED	QUOTED	QUOTED	QUOTED		QUOTED	QUOTED
5.03	SUPPLY- CIRCUIT BREAKER : 765KV, 50KA FOR 1S, 25MM/KV CREEPAGE, 3150A 3 PHASE CIRCUIT BREAKER WITHOUT PIR WITH CONTROL SWITCHING CAPABILITY ALONGWITH SUPPORT STRUCTURE, INTERPOLE CABLES, OPERATING MECHANISM, CONTROL BOXES AND ALL ACCESSORIES COMPLETE IN ALL RESPECT SUITABLE FOR 1-PHASE REACTOR SWITCHING	Kurawar (New)-Supply-3	2	NO	TB9067521491	QUOTED	QUOTED	QUOTED	QUOTED	QUOTED	QUOTED		QUOTED	QUOTED
5.04	SUPPLY- CIRCUIT BREAKER : 765KV, 50KA FOR 1S, 25MM/KV CREEPAGE, 3150A 1 PHASE CIRCUIT BREAKER WITHOUT PIR WITH CONTROL SWITCHING CAPABILITY ALONGWITH SUPPORT STRUCTURE, INTERPOLE CABLES, OPERATING MECHANISM, CONTROL BOXES AND ALL ACCESSORIES COMPLETE IN ALL RESPECT SUITABLE FOR 1-PHASE REACTOR SWITCHING	Kurawar (New)-Supply-4	2	NO	TB9067521481	QUOTED	QUOTED	QUOTED	QUOTED	QUOTED	QUOTED		QUOTED	QUOTED
5.05	SUPPLY- CIRCUIT BREAKER : 765KV, CONTROLLED SWITCHING DEVICE FOR 3-PH CIRCUIT BREAKER	Kurawar (New)-Supply-5	10	NO	TB9067001324	QUOTED	QUOTED	QUOTED	QUOTED	QUOTED	QUOTED		QUOTED	QUOTED
5.06	SUPPLY- CIRCUIT BREAKER : SPECIAL CABLES FOR CB / CSD / RP INTERFACING. MODE OF MEASUREMENT SHALL BE CABLE-TRENCH RUNNING LENGTH FROM CIRCUIT BREAKER TO CSD/ RELAY PANEL	Kurawar (New)-Supply-6	2500	MTR	TB9060001333	QUOTED	QUOTED	QUOTED	QUOTED	QUOTED	QUOTED		QUOTED	QUOTED

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1.00	2	3	4	5	6	7	8	9	10	11	12	13	14	15
5.07	SUPPLY- CIRCUIT BREAKER : 765KV, FOUNDATION BOLTS FOR CIRCUIT BREAKER, PLATFORM AND LADDER	Kurawar (New)-Supply-7	44	SET	TB9067001312	QUOTED	QUOTED	QUOTED	QUOTED	QUOTED	QUOTED		QUOTED	QUOTED
5.08	SUPPLY- CIRCUIT BREAKER : TRANSDUCERS / FIXTURES REQUIRED FOR TRAVEL MEASUREMENT OF COMPLETE 3-PHASE CB	Kurawar (New)-Supply-8	1	SET	TB9060001342	QUOTED	QUOTED	QUOTED	QUOTED	QUOTED	QUOTED		QUOTED	QUOTED
5.09	SUPPLY- CIRCUIT BREAKER : SF6 GAS FILLING ADOPTER, INCLUDING COUPLING, REGULATOR, CONNECTING HOSE PIPE UP TO GROUND LEVEL	Kurawar (New)-Supply-9	1	LOT	TB9060001356	QUOTED	QUOTED	QUOTED	QUOTED	QUOTED	QUOTED		QUOTED	QUOTED
5.10	SPARES- CIRCUIT BREAKER : 765KV, 50KA FOR 1S, 25MM/KV CREEPAGE, ONE COMPLETE POLE OF 3150A CB WITHOUT CLOSING RESISTOR, WITH GRADING CAPACITOR (IF APPLICABLE), WITH POLE COLUMN, INTERRUPTER, OPERATING MECHANISM, MARSHALING BOX, CORONA RINGS WITHOUT SUPPORT STRUCTURE.	Kurawar (New)-Supply-10	1	NO	TB8067522983	QUOTED	QUOTED	QUOTED	QUOTED	QUOTED	QUOTED		QUOTED	QUOTED
5.11	SPARES- CIRCUIT BREAKER : 765KV, 50KA FOR 1S, 25MM/KV CREEPAGE, ONE COMPLETE POLE OF 3150A CB WITH CLOSING RESISTOR, WITH GRADING CAPACITOR (IF APPLICABLE), WITH POLE COLUMN, INTERRUPTER, OPERATING MECHANISM, MARSHALING BOX, CORONA RINGS WITHOUT SUPPORT STRUCTURE.	Kurawar (New)-Supply-11	1	NO	TB8067522996	QUOTED	QUOTED	QUOTED	QUOTED	QUOTED	QUOTED		QUOTED	QUOTED
5.12	SPARES- CIRCUIT BREAKER : 765KV, GRADING CAPACITORS	Kurawar (New)-Supply-12	2	NO	TB8067000683	QUOTED	QUOTED	QUOTED	QUOTED	QUOTED	QUOTED		QUOTED	QUOTED
5.13	SPARES- CIRCUIT BREAKER : 765KV, RUBBER GASKETS, 'O' RINGS AND SEALS	Kurawar (New)-Supply-13	1	SET	TB8067001872	QUOTED	QUOTED	QUOTED	QUOTED	QUOTED	QUOTED		QUOTED	QUOTED
5.14	SPARES- CIRCUIT BREAKER : 765KV, TRIP COILS WITH RESISTOR	Kurawar (New)-Supply-14	2	SET	TB8067000624	QUOTED	QUOTED	QUOTED	QUOTED	QUOTED	QUOTED		QUOTED	QUOTED
5.15	SPARES- CIRCUIT BREAKER : 765KV, CLOSING COILS WITH RESISTOR	Kurawar (New)-Supply-15	2	SET	TB8067000636	QUOTED	QUOTED	QUOTED	QUOTED	QUOTED	QUOTED		QUOTED	QUOTED
5.16	SPARES- CIRCUIT BREAKER : 765KV, TERMINAL PAD AND CONNECTOR	Kurawar (New)-Supply-16	2	SET	TB8067003254	QUOTED	QUOTED	QUOTED	QUOTED	QUOTED	QUOTED		QUOTED	QUOTED
5.17	SPARES- CIRCUIT BREAKER : 765KV, MOLECULAR FILTER	Kurawar (New)-Supply-17	2	NO	TB8067000653	QUOTED	QUOTED	QUOTED	QUOTED	QUOTED	QUOTED		QUOTED	QUOTED
5.18	SPARES- CIRCUIT BREAKER : 765KV, CORONA RINGS	Kurawar (New)-Supply-18	1	NO	TB8067000671	QUOTED	QUOTED	QUOTED	QUOTED	QUOTED	QUOTED		QUOTED	QUOTED

Sl. No.	Item Description	Item Code / Make	Quantity	Units	Material Code	Unit Ex-Works RATE In Figures To be entered by the Bidder in Rs. P	GST on Ex-Works (in Percentage)	GST Amount (Unit Rate*Quantity* GST) Rs. P	Unit Freight & Insurance Charges in Rs. P	GST on F&I (in Percentage)	GST Amount on F&I (Unit Rate*Quantity*GST) Rs. P	HSN / SAC Code	TOTAL AMOUNT With Taxes	TOTAL Ex-Works + F & I AMOUNT including GST in Rs. P
1.00	2	3	4	5	6	7	8	9	10	11	12	13	14	15
5.19	SPARES- CIRCUIT BREAKER : 765KV, RELAY POWER CONTACTORS, SWITCH FUSE UNITS, LIMIT SWITCHES, PUSH BUTTON, TIMERS & MCB ETC	Kurawar (New)-Supply-19	1	SET	TB8067001383	QUOTED	QUOTED	QUOTED	QUOTED	QUOTED	QUOTED		QUOTED	QUOTED
5.20	SPARES- CIRCUIT BREAKER : 765KV, PRESSURE SWITCH OF EACH TYPE	Kurawar (New)-Supply-20	1	SET	TB8067003263	QUOTED	QUOTED	QUOTED	QUOTED	QUOTED	QUOTED		QUOTED	QUOTED
5.21	SPARES- CIRCUIT BREAKER : 765KV, AUXILIARY SWITCH ASSEMBLY	Kurawar (New)-Supply-21	1	SET	TB8067000893	QUOTED	QUOTED	QUOTED	QUOTED	QUOTED	QUOTED		QUOTED	QUOTED
5.22	SPARES- CIRCUIT BREAKER : 765KV, OPERATION COUNTER	Kurawar (New)-Supply-22	1	NO	TB8067000902	QUOTED	QUOTED	QUOTED	QUOTED	QUOTED	QUOTED		QUOTED	QUOTED
5.23	SPARES- CIRCUIT BREAKER : 765KV, COMPLETE DRIVE MECHANISM	Kurawar (New)-Supply-23	1	SET	TB8067001135	QUOTED	QUOTED	QUOTED	QUOTED	QUOTED	QUOTED		QUOTED	QUOTED
5.24	SPARES- CIRCUIT BREAKER : 765KV, SF6 GAS (EQUIVALENT TO 2 POLES)	Kurawar (New)-Supply-24	1	LOT	TB8067002583	QUOTED	QUOTED	QUOTED	QUOTED	QUOTED	QUOTED		QUOTED	QUOTED
5.25	SERVICES- CIRCUIT BREAKER : 765KV, SUPERVISION OF ERECTION, TESTING AND COMMISSIONING OF CIRCUIT BREAKER	Kurawar (New)-Services-1	14	NO	TB3067001366	QUOTED	QUOTED	QUOTED	Not Applicable	Not Applicable	Not Applicable		QUOTED	QUOTED
5.26	SERVICES- CIRCUIT BREAKER : 765KV, SUPERVISION OF ERECTION, TESTING AND COMMISSIONING OF 1 PHASE CIRCUIT BREAKER WITHOUT PIR SUITABLE FOR 1-PHASE REACTOR SWITCHING	Kurawar (New)-Services-2	2	NO	TB3067001521	QUOTED	QUOTED	QUOTED	Not Applicable	Not Applicable	Not Applicable		QUOTED	QUOTED
5.27	SERVICES- CIRCUIT BREAKER : 765KV, SUPERVISION OF ERECTION, TESTING AND COMMISSIONING OF CONTROLLED SWITCHING DEVICE FOR 3 PHASE CIRCUIT BREAKER	Kurawar (New)-Services-3	10	NO	TB3067001536	QUOTED	QUOTED	QUOTED	Not Applicable	Not Applicable	Not Applicable		QUOTED	QUOTED
6.01	SUPPLY- CIRCUIT BREAKER : 765KV, 50KA FOR 1S, 25MM/KV CREEPAGE, 3150A 3 PHASE CIRCUIT BREAKER WITH PIR WITH CONTROL SWITCHING CAPABILITY ALONGWITH SUPPORT STRUCTURE, INTERPOLE CABLES, OPERATING MECHANISM, CONTROL BOXES AND ALL ACCESSORIES COMPLETE IN ALL RESPECT	Mandsaur (extn)-Supply-1	4	NO	TB9067521475	QUOTED	QUOTED	QUOTED	QUOTED	QUOTED	QUOTED		QUOTED	QUOTED

Sl. No.	Item Description	Item Code / Make	Quantity	Units	Material Code	Unit Ex-Works RATE In Figures To be entered by the Bidder in Rs. P	GST on Ex-Works (in Percentage)	GST Amount (Unit Rate*Quantity* GST) Rs. P	Unit Freight & Insurance Charges in Rs. P	GST on F&I (in Percentage)	GST Amount on F&I (Unit Rate*Quantity*GST) Rs. P	HSN / SAC Code	TOTAL AMOUNT With Taxes	TOTAL Ex-Works + F & I AMOUNT including GST in Rs. P
1.00	2	3	4	5	6	7	8	9	10	11	12	13	14	15
6.02	SUPPLY- CIRCUIT BREAKER : 765KV, 50KA FOR 1S, 25MM/KV CREEPAGE, 3150A 3 PHASE CIRCUIT BREAKER WITHOUT PIR WITH CONTROL SWITCHING CAPABILITY ALONGWITH SUPPORT STRUCTURE, INTERPOLE CABLES, OPERATING MECHANISM, CONTROL BOXES AND ALL ACCESSORIES COMPLETE IN ALL RESPECT SUITABLE FOR 1-PHASE REACTOR SWITCHING	Mandsaur (extn)-Supply-2	2	NO	TB9067521491	QUOTED	QUOTED	QUOTED	QUOTED	QUOTED	QUOTED		QUOTED	QUOTED
6.03	SUPPLY- CIRCUIT BREAKER : 765KV, 50KA FOR 1S, 25MM/KV CREEPAGE, 3150A 1 PHASE CIRCUIT BREAKER WITHOUT PIR WITH CONTROL SWITCHING CAPABILITY ALONGWITH SUPPORT STRUCTURE, INTERPOLE CABLES, OPERATING MECHANISM, CONTROL BOXES AND ALL ACCESSORIES COMPLETE IN ALL RESPECT SUITABLE FOR 1-PHASE REACTOR SWITCHING	Mandsaur (extn)-Supply-3	1	NO	TB9067521481	QUOTED	QUOTED	QUOTED	QUOTED	QUOTED	QUOTED		QUOTED	QUOTED
6.04	SUPPLY- CIRCUIT BREAKER : 765KV, CONTROLLED SWITCHING DEVICE FOR 3-PH CIRCUIT BREAKER	Mandsaur (extn)-Supply-4	2	NO	TB9067001324	QUOTED	QUOTED	QUOTED	QUOTED	QUOTED	QUOTED		QUOTED	QUOTED
6.05	SUPPLY- CIRCUIT BREAKER : SPECIAL CABLES FOR CB / CSD / RP INTERFACING. MODE OF MEASUREMENT SHALL BE CABLE-TRENCH RUNNING LENGTH FROM CIRCUIT BREAKER TO CSD/ RELAY PANEL	Mandsaur (extn)-Supply-5	500	MTR	TB9060001333	QUOTED	QUOTED	QUOTED	QUOTED	QUOTED	QUOTED		QUOTED	QUOTED
6.06	SUPPLY- CIRCUIT BREAKER : 765KV, FOUNDATION BOLTS FOR CIRCUIT BREAKER, PLATFORM AND LADDER	Mandsaur (extn)-Supply-6	19	SET	TB9067001312	QUOTED	QUOTED	QUOTED	QUOTED	QUOTED	QUOTED		QUOTED	QUOTED
6.07	SUPPLY- CIRCUIT BREAKER : TRANSDUCERS / FIXTURES REQUIRED FOR TRAVEL MEASUREMENT OF COMPLETE 3-PHASE CB	Mandsaur (extn)-Supply-7	1	SET	TB9060001342	QUOTED	QUOTED	QUOTED	QUOTED	QUOTED	QUOTED		QUOTED	QUOTED
6.08	SUPPLY- CIRCUIT BREAKER : SF6 GAS FILLING ADOPTER, INCLUDING COUPLING, REGULATOR, CONNECTING HOSE PIPE UP TO GROUND LEVEL	Mandsaur (extn)-Supply-8	1	LOT	TB9060001356	QUOTED	QUOTED	QUOTED	QUOTED	QUOTED	QUOTED		QUOTED	QUOTED

Sl. No.	Item Description	Item Code / Make	Quantity	Units	Material Code	Unit Ex-Works RATE In Figures To be entered by the Bidder in Rs. P	GST on Ex-Works (in Percentage)	GST Amount (Unit Rate*Quantity* GST) Rs. P	Unit Freight & Insurance Charges in Rs. P	GST on F&I (in Percentage)	GST Amount on F&I (Unit Rate*Quantity*GST) Rs. P	HSN / SAC Code	TOTAL AMOUNT With Taxes	TOTAL Ex-Works + F & I AMOUNT including GST in Rs. P
1.00	2	3	4	5	6	7	8	9	10	11	12	13	14	15
6.09	SPARES- CIRCUIT BREAKER : 765KV, 50KA FOR 1S, 25MM/KV CREEPAGE, ONE COMPLETE POLE OF 3150A CB WITHOUT CLOSING RESISTOR, WITH GRADING CAPACITOR (IF APPLICABLE), WITH POLE COLUMN, INTERRUPTER, OPERATING MECHANISM, MARSHALING BOX, CORONA RINGS WITHOUT SUPPORT STRUCTURE.	Mandsaur (extn)-Supply-9	1	NO	TB8067522983	QUOTED	QUOTED	QUOTED	QUOTED	QUOTED	QUOTED		QUOTED	QUOTED
6.10	SPARES- CIRCUIT BREAKER : 765KV, 50KA FOR 1S, 25MM/KV CREEPAGE, ONE COMPLETE POLE OF 3150A CB WITH CLOSING RESISTOR, WITH GRADING CAPACITOR (IF APPLICABLE), WITH POLE COLUMN, INTERRUPTER, OPERATING MECHANISM, MARSHALING BOX, CORONA RINGS WITHOUT SUPPORT STRUCTURE.	Mandsaur (extn)-Supply-10	1	NO	TB8067522996	QUOTED	QUOTED	QUOTED	QUOTED	QUOTED	QUOTED		QUOTED	QUOTED
6.11	SPARES- CIRCUIT BREAKER : 765KV, GRADING CAPACITORS	Mandsaur (extn)-Supply-11	2	NO	TB8067000683	QUOTED	QUOTED	QUOTED	QUOTED	QUOTED	QUOTED		QUOTED	QUOTED
6.12	SPARES- CIRCUIT BREAKER : 765KV, RUBBER GASKETS, 'O' RINGS AND SEALS	Mandsaur (extn)-Supply-12	1	SET	TB8067001872	QUOTED	QUOTED	QUOTED	QUOTED	QUOTED	QUOTED		QUOTED	QUOTED
6.13	SPARES- CIRCUIT BREAKER : 765KV, TRIP COILS WITH RESISTOR	Mandsaur (extn)-Supply-13	2	SET	TB8067000624	QUOTED	QUOTED	QUOTED	QUOTED	QUOTED	QUOTED		QUOTED	QUOTED
6.14	SPARES- CIRCUIT BREAKER : 765KV, CLOSING COILS WITH RESISTOR	Mandsaur (extn)-Supply-14	2	SET	TB8067000636	QUOTED	QUOTED	QUOTED	QUOTED	QUOTED	QUOTED		QUOTED	QUOTED
6.15	SPARES- CIRCUIT BREAKER : 765KV, TERMINAL PAD AND CONNECTOR	Mandsaur (extn)-Supply-15	2	SET	TB8067003254	QUOTED	QUOTED	QUOTED	QUOTED	QUOTED	QUOTED		QUOTED	QUOTED
6.16	SPARES- CIRCUIT BREAKER : 765KV, MOLECULAR FILTER	Mandsaur (extn)-Supply-16	2	NO	TB8067000653	QUOTED	QUOTED	QUOTED	QUOTED	QUOTED	QUOTED		QUOTED	QUOTED
6.17	SPARES- CIRCUIT BREAKER : 765KV, CORONA RINGS	Mandsaur (extn)-Supply-17	1	NO	TB8067000671	QUOTED	QUOTED	QUOTED	QUOTED	QUOTED	QUOTED		QUOTED	QUOTED
6.18	SPARES- CIRCUIT BREAKER : 765KV, RELAY POWER CONTACTORS, SWITCH FUSE UNITS, LIMIT SWITCHES, PUSH BUTTON, TIMERS & MCB ETC	Mandsaur (extn)-Supply-18	1	SET	TB8067001383	QUOTED	QUOTED	QUOTED	QUOTED	QUOTED	QUOTED		QUOTED	QUOTED
6.19	SPARES- CIRCUIT BREAKER : 765KV, PRESSURE SWITCH OF EACH TYPE	Mandsaur (extn)-Supply-19	1	SET	TB8067003263	QUOTED	QUOTED	QUOTED	QUOTED	QUOTED	QUOTED		QUOTED	QUOTED
6.20	SPARES- CIRCUIT BREAKER : 765KV, AUXILIARY SWITCH ASSEMBLY	Mandsaur (extn)-Supply-20	1	SET	TB8067000893	QUOTED	QUOTED	QUOTED	QUOTED	QUOTED	QUOTED		QUOTED	QUOTED
6.21	SPARES- CIRCUIT BREAKER : 765KV, OPERATION COUNTER	Mandsaur (extn)-Supply-21	1	NO	TB8067000902	QUOTED	QUOTED	QUOTED	QUOTED	QUOTED	QUOTED		QUOTED	QUOTED

Sl. No.	Item Description	Item Code / Make	Quantity	Units	Material Code	Unit Ex-Works RATE In Figures To be entered by the Bidder in Rs. P	GST on Ex-Works (in Percentage)	GST Amount (Unit Rate*Quantity* GST) Rs. P	Unit Freight & Insurance Charges in Rs. P	GST on F&I (in Percentage)	GST Amount on F&I (Unit Rate*Quantity*GST) Rs. P	HSN / SAC Code	TOTAL AMOUNT With Taxes	TOTAL Ex-Works + F & I AMOUNT including GST in Rs. P
1.00	2	3	4	5	6	7	8	9	10	11	12	13	14	15
6.22	SPARES- CIRCUIT BREAKER : 765KV, COMPLETE DRIVE MECHANISM	Mandsaur (extn)-Supply-22	1	SET	TB8067001135	QUOTED	QUOTED	QUOTED	QUOTED	QUOTED	QUOTED		QUOTED	QUOTED
6.23	SPARES- CIRCUIT BREAKER : 765KV, SF6 GAS (EQUIVALENT TO 2 POLES)	Mandsaur (extn)-Supply-23	1	LOT	TB8067002583	QUOTED	QUOTED	QUOTED	QUOTED	QUOTED	QUOTED		QUOTED	QUOTED
6.24	SERVICES- CIRCUIT BREAKER : 765KV, SUPERVISION OF ERECTION, TESTING AND COMMISSIONING OF CIRCUIT BREAKER	Mandsaur (extn)-Services-1	6	NO	TB3067001366	QUOTED	QUOTED	QUOTED	Not Applicable	Not Applicable	Not Applicable		QUOTED	QUOTED
6.25	SERVICES- CIRCUIT BREAKER : 765KV, SUPERVISION OF ERECTION, TESTING AND COMMISSIONING OF 1 PHASE CIRCUIT BREAKER WITHOUT PIR SUITABLE FOR 1-PHASE REACTOR SWITCHING	Mandsaur (extn)-Services-2	1	NO	TB3067001521	QUOTED	QUOTED	QUOTED	Not Applicable	Not Applicable	Not Applicable		QUOTED	QUOTED
6.26	SERVICES- CIRCUIT BREAKER : 765KV, SUPERVISION OF ERECTION, TESTING AND COMMISSIONING OF CONTROLLED SWITCHING DEVICE FOR 3 PHASE CIRCUIT BREAKER	Mandsaur (extn)-Services-3	2	NO	TB3067001536	QUOTED	QUOTED	QUOTED	Not Applicable	Not Applicable	Not Applicable		QUOTED	QUOTED
Total in Figures													QUOTED	QUOTED

UNPRICED FORMAT

Tender Inviting Authority: BHEL, TBG Noida

TENDER DESCRIPTION: SUPPLY AND SUPERVISION OF ETC OF CIRCUIT BREAKERS (420KV AND BELOW RATING CB- PACKAGE-II) FOR VARIOUS POWERGRID PROJECTS.

Enquiry/NIT No:

Name of the Bidder/ Bidding Firm / Company :	

PRICE SCHEDULE (BoQ2 is applicable only for Indian Bidders)

(This BOQ template must not be modified/replaced by the bidder and the same should be uploaded after filling the relevent columns, else the bidder is liable to be rejected for this tender. Bidders are allowed to enter the Bidder Name and Values only)

NUMBER #	TEXT #	TEXT #	NUMBER #	TEXT #	TEXT	NUMBER #	NUMBER	NUMBER	NUMBER	NUMBER	NUMBER	NUMBER #	NUMBER #	NUMBER #
Sl. No.	Item Description	Project & supply/ services	Quantity	Units	Material code	Unit Ex-Works RATE In Figures To be entered by the Bidder in Rs. P	GST on Ex-Works (in Percentage)	GST Amount (Unit Rate*Quantity* GST) Rs. P	Unit Freight & Insurance Charges in Rs. P	GST on F&I (in Percentage)	GST Amount on F&I (Unit Rate*Quantity*GST) Rs. P	HSN / SAC Code	TOTAL Ex-Works + F & I AMOUNT excluding GST in Rs. P	TOTAL Ex-Works + F & I AMOUNT including GST in Rs. P
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
1.01	SUPPLY- CIRCUIT BREAKER : 420KV, 63KA FOR 1S, 25MM/KV CREEPAGE, 3150A 3PHASE CIRCUIT BREAKER WITHOUT PIR ALONGWITH SUPPORT STRUCTURE, INTERPOLE CABLES, OPERATING MECHANISM, CONTROL BOXESAND ALL ACCESSORIES COMPLETE IN ALL RESPECT	Mandsaur (New)-Supply-1	15	NO	TB9064622591	QUOTED	QUOTED	QUOTED	QUOTED	QUOTED	QUOTED		QUOTED	QUOTED
1.02	SUPPLY- CIRCUIT BREAKER : 245KV, 50KA FOR 1S, 25MM/KV CREEPAGE, 3150A 3PHASE CIRCUIT BREAKER WITHOUT PIR ALONGWITH SUPPORT STRUCTURE, INTERPOLE CABLES, OPERATING MECHANISM, CONTROL BOXESAND ALL ACCESSORIES COMPLETE IN ALL RESPECT	Mandsaur (New)-Supply-2	4	NO	TB9062522593	QUOTED	QUOTED	QUOTED	QUOTED	QUOTED	QUOTED		QUOTED	QUOTED
1.03	SUPPLY- CIRCUIT BREAKER : 245KV, 50KA FOR 1S, 25MM/KV CREEPAGE, 1600A 3PHASE CIRCUIT BREAKER WITHOUT PIR ALONGWITH SUPPORT STRUCTURE, INTERPOLE CABLES, OPERATING MECHANISM, CONTROL BOXESAND ALL ACCESSORIES COMPLETE IN ALL RESPECT	Mandsaur (New)-Supply-3	14	NO	TB9062522601	QUOTED	QUOTED	QUOTED	QUOTED	QUOTED	QUOTED		QUOTED	QUOTED
1.04	SUPPLY- CIRCUIT BREAKER : 145KV, 31.5KA FOR 1S, 25MM/KV CREEPAGE, 1250A, 1 PHASE CIRCUIT BREAKER FOR NGR BY PASSING, ALONGWITH SUPPORT STRUCTURE, INTERPOLE CABLES, OPERATING MECHANISM, CONTROL BOXES AND ALL ACCESSORIES COMPLETE IN ALL RESPECT	Mandsaur (New)-Supply-4	2	NO	TB9061322085	QUOTED	QUOTED	QUOTED	QUOTED	QUOTED	QUOTED		QUOTED	QUOTED

Sl. No.	Item Description	Project & supply/ services	Quantity	Units	Material code	Unit Ex-Works RATE In Figures To be entered by the Bidder in Rs. P	GST on Ex-Works (in Percentage)	GST Amount (Unit Rate*Quantity* GST) Rs. P	Unit Freight & Insurance Charges in Rs. P	GST on F&I (in Percentage)	GST Amount on F&I (Unit Rate*Quantity*GST) Rs. P	HSN / SAC Code	TOTAL Ex-Works + F & I AMOUNT excluding GST in Rs. P	TOTAL Ex-Works + F & I AMOUNT including GST in Rs. P
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
1.05	SUPPLY- CIRCUIT BREAKER : 72.5KV, 25KA FOR 1S, 25MM/KV CREEPAGE, 1250A 3PHASE CIRCUIT BREAKER WITHOUT PIR ALONGWITH SUPPORT STRUCTURE, INTERPOLE CABLES, OPERATING MECHANISM, CONTROL BOXESAND ALL ACCESSORIES COMPLETE IN ALL RESPECT	Mandsaur (New)-Supply-5	1	NO	TB9066222614	QUOTED	QUOTED	QUOTED	QUOTED	QUOTED	QUOTED		QUOTED	QUOTED
1.06	SUPPLY- CIRCUIT BREAKER : 420KV, CONTROLLED SWITCHING DEVICE FOR 3-PH CIRCUIT BREAKER	Mandsaur (New)-Supply-6	10	NO	TB9064001325	QUOTED	QUOTED	QUOTED	QUOTED	QUOTED	QUOTED		QUOTED	QUOTED
1.07	SUPPLY- CIRCUIT BREAKER : SPECIAL CABLES FOR CB / CSD / RP INTERFACING. MODE OF MEASUREMENT SHALL BE CABLE-TRENCH RUNNING LENGTH FROM CIRCUIT BREAKER TO CSD/ RELAY PANEL	Mandsaur (New)-Supply-7	2000	MTR	TB9060001333	QUOTED	QUOTED	QUOTED	QUOTED	QUOTED	QUOTED		QUOTED	QUOTED
1.08	SUPPLY- CIRCUIT BREAKER : 400KV, FOUNDATION BOLTS FOR CIRCUIT BREAKER, PLATFORM AND LADDER	Mandsaur (New)-Supply-8	45	SET	TB9064001315	QUOTED	QUOTED	QUOTED	QUOTED	QUOTED	QUOTED		QUOTED	QUOTED
1.09	SUPPLY- CIRCUIT BREAKER : 220KV, FOUNDATION BOLTS FOR CIRCUIT BREAKER, PLATFORM AND LADDER	Mandsaur (New)-Supply-9	54	SET	TB9062001314	QUOTED	QUOTED	QUOTED	QUOTED	QUOTED	QUOTED		QUOTED	QUOTED
1.10	SUPPLY- CIRCUIT BREAKER : 145KV, FOUNDATION BOLTS FOR CIRCUIT BREAKER, PLATFORM AND LADDER	Mandsaur (New)-Supply-10	2	SET	TB9061001315	QUOTED	QUOTED	QUOTED	QUOTED	QUOTED	QUOTED		QUOTED	QUOTED
1.11	SUPPLY- CIRCUIT BREAKER : 72.5KV, FOUNDATION BOLTS FOR CIRCUIT BREAKER, PLATFORM AND LADDER	Mandsaur (New)-Supply-11	3	SET	TB9066001316	QUOTED	QUOTED	QUOTED	QUOTED	QUOTED	QUOTED		QUOTED	QUOTED
1.12	SUPPLY- CIRCUIT BREAKER : SF6 GAS FILLING ADOPTER, INCLUDING COUPLING, REGULATOR, CONNECTING HOSE PIPE UP TO GROUND LEVEL	Mandsaur (New)-Supply-12	1	LOT	TB9060001356	QUOTED	QUOTED	QUOTED	QUOTED	QUOTED	QUOTED		QUOTED	QUOTED
1.13	SUPPLY- CIRCUIT BREAKER : TRANSDUCERS / FIXTURES REQUIRED FOR TRAVEL MEASUREMENT OF COMPLETE 3-PHASE CB	Mandsaur (New)-Supply-13	1	LOT	TB9060001342	QUOTED	QUOTED	QUOTED	QUOTED	QUOTED	QUOTED		QUOTED	QUOTED
1.14	SERVICES- CIRCUIT BREAKER : 400KV, SUPERVISION OF ERECTION, TESTING AND COMMISSIONING OF CIRCUIT BREAKER	Mandsaur (New)-Services-1	15	NO	TB3064001364	QUOTED	QUOTED	QUOTED	Not Applicable	Not Applicable	Not Applicable		QUOTED	QUOTED
1.15	SERVICES- CIRCUIT BREAKER : 220KV, SUPERVISION OF ERECTION, TESTING AND COMMISSIONING OF CIRCUIT BREAKER	Mandsaur (New)-Services-2	18	NO	TB3062001364	QUOTED	QUOTED	QUOTED	Not Applicable	Not Applicable	Not Applicable		QUOTED	QUOTED

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1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
1.16	SERVICES- CIRCUIT BREAKER : 145KV, SUPERVISION OF ERECTION, TESTING AND COMMISSIONING OF 1 PHASE CIRCUIT BREAKER	Mandsaur (New)-Services-3	2	NO	TB3061003271	QUOTED	QUOTED	QUOTED	Not Applicable	Not Applicable	Not Applicable		QUOTED	QUOTED
1.17	SERVICES- CIRCUIT BREAKER : 72.5KV, SUPERVISION OF ERECTION, TESTING AND COMMISSIONING OF CIRCUIT BREAKER	Mandsaur (New)-Services-4	1	NO	TB3066001362	QUOTED	QUOTED	QUOTED	Not Applicable	Not Applicable	Not Applicable		QUOTED	QUOTED
1.18	SERVICES- CIRCUIT BREAKER : 400KV, SUPERVISION OF ERECTION TESTING AND COMMISSIONING OF CONTROLLED SWITCHING DEVICE	Mandsaur (New)-Services-5	10	NO	TB3064001372	QUOTED	QUOTED	QUOTED	Not Applicable	Not Applicable	Not Applicable		QUOTED	QUOTED
2.01	SUPPLY- CIRCUIT BREAKER : 420KV, 63KA FOR 1S, 25MM/KV CREEPAGE, 3150A 3PHASE CIRCUIT BREAKER WITHOUT PIR ALONGWITH SUPPORT STRUCTURE, INTERPOLE CABLES, OPERATING MECHANISM, CONTROL BOXESAND ALL ACCESSORIES COMPLETE IN ALL RESPECT	Barmer-I (New)-Supply-1	14	NO	TB9064622591	QUOTED	QUOTED	QUOTED	QUOTED	QUOTED	QUOTED		QUOTED	QUOTED
2.02	SUPPLY- CIRCUIT BREAKER : 245KV, 50KA FOR 1S, 25MM/KV CREEPAGE, 3150A 3PHASE CIRCUIT BREAKER WITHOUT PIR ALONGWITH SUPPORT STRUCTURE, INTERPOLE CABLES, OPERATING MECHANISM, CONTROL BOXESAND ALL ACCESSORIES COMPLETE IN ALL RESPECT	Barmer-I (New)-Supply-2	1	NO	TB9062522593	QUOTED	QUOTED	QUOTED	QUOTED	QUOTED	QUOTED		QUOTED	QUOTED
2.03	SUPPLY- CIRCUIT BREAKER : 245KV, 50KA FOR 1S, 25MM/KV CREEPAGE, 1600A 3PHASE CIRCUIT BREAKER WITHOUT PIR ALONGWITH SUPPORT STRUCTURE, INTERPOLE CABLES, OPERATING MECHANISM, CONTROL BOXESAND ALL ACCESSORIES COMPLETE IN ALL RESPECT	Barmer-I (New)-Supply-3	7	NO	TB9062522601	QUOTED	QUOTED	QUOTED	QUOTED	QUOTED	QUOTED		QUOTED	QUOTED
2.04	SUPPLY- CIRCUIT BREAKER : 145KV, 31.5KA FOR 1S, 25MM/KV CREEPAGE, 1250A, 1 PHASE CIRCUIT BREAKER FOR NGR BY PASSING, ALONGWITH SUPPORT STRUCTURE, INTERPOLE CABLES, OPERATING MECHANISM, CONTROL BOXES AND ALL ACCESSORIES COMPLETE IN ALL RESPECT	Barmer-I (New)-Supply-4	2	NO	TB9061322085	QUOTED	QUOTED	QUOTED	QUOTED	QUOTED	QUOTED		QUOTED	QUOTED

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1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
2.05	SUPPLY- CIRCUIT BREAKER : 72.5KV, 25KA FOR 1S, 25MM/KV CREEPAGE, 1250A 3PHASE CIRCUIT BREAKER WITHOUT PIR ALONGWITH SUPPORT STRUCTURE, INTERPOLE CABLES, OPERATING MECHANISM, CONTROL BOXESAND ALL ACCESSORIES COMPLETE IN ALL RESPECT	Barmer-I (New)-Supply-5	1	NO	TB9066222614	QUOTED	QUOTED	QUOTED	QUOTED	QUOTED	QUOTED		QUOTED	QUOTED
2.06	SUPPLY- CIRCUIT BREAKER : 420KV, CONTROLLED SWITCHING DEVICE FOR 3-PH CIRCUIT BREAKER	Barmer-I (New)-Supply-6	11	NO	TB9064001325	QUOTED	QUOTED	QUOTED	QUOTED	QUOTED	QUOTED		QUOTED	QUOTED
2.07	SUPPLY- CIRCUIT BREAKER : SPECIAL CABLES FOR CB / CSD / RP INTERFACING. MODE OF MEASUREMENT SHALL BE CABLE-TRENCH RUNNING LENGTH FROM CIRCUIT BREAKER TO CSD/ RELAY PANEL	Barmer-I (New)-Supply-7	2200	MTR	TB9060001333	QUOTED	QUOTED	QUOTED	QUOTED	QUOTED	QUOTED		QUOTED	QUOTED
2.08	SUPPLY- CIRCUIT BREAKER : 400KV, FOUNDATION BOLTS FOR CIRCUIT BREAKER, PLATFORM AND LADDER	Barmer-I (New)-Supply-8	42	SET	TB9064001315	QUOTED	QUOTED	QUOTED	QUOTED	QUOTED	QUOTED		QUOTED	QUOTED
2.09	SUPPLY- CIRCUIT BREAKER : 220KV, FOUNDATION BOLTS FOR CIRCUIT BREAKER, PLATFORM AND LADDER	Barmer-I (New)-Supply-9	24	SET	TB9062001314	QUOTED	QUOTED	QUOTED	QUOTED	QUOTED	QUOTED		QUOTED	QUOTED
2.10	SUPPLY- CIRCUIT BREAKER : 145KV, FOUNDATION BOLTS FOR CIRCUIT BREAKER, PLATFORM AND LADDER	Barmer-I (New)-Supply-10	2	SET	TB9061001315	QUOTED	QUOTED	QUOTED	QUOTED	QUOTED	QUOTED		QUOTED	QUOTED
2.11	SUPPLY- CIRCUIT BREAKER : 72.5KV, FOUNDATION BOLTS FOR CIRCUIT BREAKER, PLATFORM AND LADDER	Barmer-I (New)-Supply-11	3	SET	TB9066001316	QUOTED	QUOTED	QUOTED	QUOTED	QUOTED	QUOTED		QUOTED	QUOTED
2.12	SUPPLY- CIRCUIT BREAKER : SF6 GAS FILLING ADOPTER, INCLUDING COUPLING, REGULATOR, CONNECTING HOSE PIPE UP TO GROUND LEVEL	Barmer-I (New)-Supply-12	1	LOT	TB9060001356	QUOTED	QUOTED	QUOTED	QUOTED	QUOTED	QUOTED		QUOTED	QUOTED
2.13	SUPPLY- CIRCUIT BREAKER : TRANSDUCERS / FIXTURES REQUIRED FOR TRAVEL MEASUREMENT OF COMPLETE 3-PHASE CB	Barmer-I (New)-Supply-13	1	LOT	TB9060001342	QUOTED	QUOTED	QUOTED	QUOTED	QUOTED	QUOTED		QUOTED	QUOTED
2.14	SPARES- CIRCUIT BREAKER : 420KV, 63KA FOR 1S, 25MM/KV CREEPAGE, ONE COMPLETE POLE OF 3150A CB WITHOUT PIR, WITH POLE COLUMN INTERRUPTER, DRIVING MECHANISM AND MARSHALING BOX EXCLUDING SUPPORT STRUCTURE	Barmer-I (New)-Supply-14	1	NO	TB8064620544	QUOTED	QUOTED	QUOTED	QUOTED	QUOTED	QUOTED		QUOTED	QUOTED
2.15	SPARES- CIRCUIT BREAKER : 400KV, GRADING CAPACITORS	Barmer-I (New)-Supply-15	2	NO	TB8064000685	QUOTED	QUOTED	QUOTED	QUOTED	QUOTED	QUOTED		QUOTED	QUOTED

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1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
2.16	SPARES- CIRCUIT BREAKER : 420KV, RUBBER GASKETS, 'O' RINGS AND SEALS	Barmer-I (New)-Supply-16	1	SET	TB8064001873	QUOTED	QUOTED	QUOTED	QUOTED	QUOTED	QUOTED		QUOTED	QUOTED
2.17	SPARES- CIRCUIT BREAKER : 400KV, TRIP COILS WITH RESISTOR	Barmer-I (New)-Supply-17	2	SET	TB8064000626	QUOTED	QUOTED	QUOTED	QUOTED	QUOTED	QUOTED		QUOTED	QUOTED
2.18	SPARES- CIRCUIT BREAKER : 400KV, CLOSING COILS WITH RESISTOR	Barmer-I (New)-Supply-18	1	SET	TB8064000631	QUOTED	QUOTED	QUOTED	QUOTED	QUOTED	QUOTED		QUOTED	QUOTED
2.19	SPARES- CIRCUIT BREAKER : 400KV, TERMINAL PAD AND CONNECTOR	Barmer-I (New)-Supply-19	2	SET	TB8064003251	QUOTED	QUOTED	QUOTED	QUOTED	QUOTED	QUOTED		QUOTED	QUOTED
2.20	SPARES- CIRCUIT BREAKER : 400KV, MOLECULAR FILTER	Barmer-I (New)-Supply-20	2	NO	TB8064000652	QUOTED	QUOTED	QUOTED	QUOTED	QUOTED	QUOTED		QUOTED	QUOTED
2.21	SPARES- CIRCUIT BREAKER : 400KV, CORONA RINGS	Barmer-I (New)-Supply-21	1	NO	TB8064000674	QUOTED	QUOTED	QUOTED	QUOTED	QUOTED	QUOTED		QUOTED	QUOTED
2.22	SPARES- CIRCUIT BREAKER : 400KV, RELAY POWER CONTACTORS, SWITCH FUSE UNITS, LIMIT SWITCHES, PUSH BUTTON, TIMERS & MCB ETC	Barmer-I (New)-Supply-22	1	SET	TB8064001381	QUOTED	QUOTED	QUOTED	QUOTED	QUOTED	QUOTED		QUOTED	QUOTED
2.23	SPARES- CIRCUIT BREAKER : 400KV, PRESSURE SWITCH OF EACH TYPE/DENSITY MONITOR	Barmer-I (New)-Supply-23	1	SET	TB8064001393	QUOTED	QUOTED	QUOTED	QUOTED	QUOTED	QUOTED		QUOTED	QUOTED
2.24	SPARES- CIRCUIT BREAKER : 400KV, AUXILIARY SWITCH ASSEMBLY	Barmer-I (New)-Supply-24	1	SET	TB8064000896	QUOTED	QUOTED	QUOTED	QUOTED	QUOTED	QUOTED		QUOTED	QUOTED
2.25	SPARES- CIRCUIT BREAKER : 400KV, OPERATION COUNTER	Barmer-I (New)-Supply-25	1	NO	TB8064000903	QUOTED	QUOTED	QUOTED	QUOTED	QUOTED	QUOTED		QUOTED	QUOTED
2.26	SPARES- CIRCUIT BREAKER : 400KV, COMPLETE DRIVE MECHANISM	Barmer-I (New)-Supply-26	1	SET	TB8064001133	QUOTED	QUOTED	QUOTED	QUOTED	QUOTED	QUOTED		QUOTED	QUOTED
2.27	SPARES- CIRCUIT BREAKER : 400KV, SF6 GAS (EQUIVALENT TO 2 POLES)	Barmer-I (New)-Supply-27	1	LOT	TB8064002581	QUOTED	QUOTED	QUOTED	QUOTED	QUOTED	QUOTED		QUOTED	QUOTED
2.28	SPARES- CIRCUIT BREAKER : 220KV, 50KA FOR 1S, 25MM/KV CREEPAGE, ONE COMPLETE POLE OF 1600A CB WITHOUT PIR, WITH POLE COLUMN INTERRUPTER, DRIVING MECHANISM AND MARSHALING BOX EXCLUDING SUPPORT STRUCTURE	Barmer-I (New)-Supply-28	1	NO	TB8062522953	QUOTED	QUOTED	QUOTED	QUOTED	QUOTED	QUOTED		QUOTED	QUOTED
2.29	SPARES- CIRCUIT BREAKER : 220KV, RUBBER GASKETS, 'O' RINGS AND SEALS	Barmer-I (New)-Supply-29	2	SET	TB8062001875	QUOTED	QUOTED	QUOTED	QUOTED	QUOTED	QUOTED		QUOTED	QUOTED
2.30	SPARES- CIRCUIT BREAKER : 220KV, TRIP COILS WITH RESISTOR	Barmer-I (New)-Supply-30	2	SET	TB8062000621	QUOTED	QUOTED	QUOTED	QUOTED	QUOTED	QUOTED		QUOTED	QUOTED
2.31	SPARES- CIRCUIT BREAKER : 220KV, CLOSING COILS WITH RESISTOR	Barmer-I (New)-Supply-31	2	SET	TB8062000631	QUOTED	QUOTED	QUOTED	QUOTED	QUOTED	QUOTED		QUOTED	QUOTED

Sl. No.	Item Description	Project & supply/ services	Quantity	Units	Material code	Unit Ex-Works RATE In Figures To be entered by the Bidder in Rs. P	GST on Ex-Works (in Percentage)	GST Amount (Unit Rate*Quantity* GST) Rs. P	Unit Freight & Insurance Charges in Rs. P	GST on F&I (in Percentage)	GST Amount on F&I (Unit Rate*Quantity*GST) Rs. P	HSN / SAC Code	TOTAL Ex-Works + F & I AMOUNT excluding GST in Rs. P	TOTAL Ex-Works + F & I AMOUNT including GST in Rs. P
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
2.32	SPARES- CIRCUIT BREAKER : 220KV, TERMINAL PAD AND CONNECTOR	Barmer-I (New)-Supply-32	2	SET	TB8062003251	QUOTED	QUOTED	QUOTED	QUOTED	QUOTED	QUOTED		QUOTED	QUOTED
2.33	SPARES- CIRCUIT BREAKER : 220KV, MOLECULAR FILTER	Barmer-I (New)-Supply-33	2	NO	TB8062000653	QUOTED	QUOTED	QUOTED	QUOTED	QUOTED	QUOTED		QUOTED	QUOTED
2.34	SPARES- CIRCUIT BREAKER : 220KV, CORONA RINGS	Barmer-I (New)-Supply-34	1	NO	TB8062000672	QUOTED	QUOTED	QUOTED	QUOTED	QUOTED	QUOTED		QUOTED	QUOTED
2.35	SPARES- CIRCUIT BREAKER : 220KV, RELAY POWER CONTACTORS, SWITCH FUSE UNITS, LIMIT SWITCHES, PUSH BUTTON, TIMERS & MCB ETC	Barmer-I (New)-Supply-35	1	SET	TB8062001386	QUOTED	QUOTED	QUOTED	QUOTED	QUOTED	QUOTED		QUOTED	QUOTED
2.36	SPARES- CIRCUIT BREAKER : 220KV, PRESSURE SWITCH OF EACH TYPE/DENSITY MONITOR	Barmer-I (New)-Supply-36	1	SET	TB8062001392	QUOTED	QUOTED	QUOTED	QUOTED	QUOTED	QUOTED		QUOTED	QUOTED
2.37	SPARES- CIRCUIT BREAKER : 220KV, AUXILIARY SWITCH ASSEMBLY	Barmer-I (New)-Supply-37	1	SET	TB8062000894	QUOTED	QUOTED	QUOTED	QUOTED	QUOTED	QUOTED		QUOTED	QUOTED
2.38	SPARES- CIRCUIT BREAKER : 220KV, OPERATION COUNTER	Barmer-I (New)-Supply-38	1	NO	TB8062000902	QUOTED	QUOTED	QUOTED	QUOTED	QUOTED	QUOTED		QUOTED	QUOTED
2.39	SPARES- CIRCUIT BREAKER : 220KV, COMPLETE DRIVE MECHANISM	Barmer-I (New)-Supply-39	1	SET	TB8062001134	QUOTED	QUOTED	QUOTED	QUOTED	QUOTED	QUOTED		QUOTED	QUOTED
2.40	SPARES- CIRCUIT BREAKER : 220KV, SF6 GAS (EQUIVALENT TO 2 POLES)	Barmer-I (New)-Supply-40	1	LOT	TB8062002584	QUOTED	QUOTED	QUOTED	QUOTED	QUOTED	QUOTED		QUOTED	QUOTED
2.41	SERVICES- CIRCUIT BREAKER : 400KV, SUPERVISION OF ERECTION, TESTING AND COMMISSIONING OF CIRCUIT BREAKER	Barmer-I (New)-Services-1	14	NO	TB3064001364	QUOTED	QUOTED	QUOTED	Not Applicable	Not Applicable	Not Applicable		QUOTED	QUOTED
2.42	SERVICES- CIRCUIT BREAKER : 220KV, SUPERVISION OF ERECTION, TESTING AND COMMISSIONING OF CIRCUIT BREAKER	Barmer-I (New)-Services-2	8	NO	TB3062001364	QUOTED	QUOTED	QUOTED	Not Applicable	Not Applicable	Not Applicable		QUOTED	QUOTED
2.43	SERVICES- CIRCUIT BREAKER : 145KV, SUPERVISION OF ERECTION, TESTING AND COMMISSIONING OF 1 PHASE CIRCUIT BREAKER	Barmer-I (New)-Services-3	2	NO	TB3061003271	QUOTED	QUOTED	QUOTED	Not Applicable	Not Applicable	Not Applicable		QUOTED	QUOTED
2.44	SERVICES- CIRCUIT BREAKER : 72.5KV, SUPERVISION OF ERECTION, TESTING AND COMMISSIONING OF CIRCUIT BREAKER	Barmer-I (New)-Services-4	1	NO	TB3066001362	QUOTED	QUOTED	QUOTED	Not Applicable	Not Applicable	Not Applicable		QUOTED	QUOTED
2.45	SERVICES- CIRCUIT BREAKER : 400KV, SUPERVISION OF ERECTION TESTING AND COMMISSIONING OF CONTROLLED SWITCHING DEVICE	Barmer-I (New)-Services-5	11	NO	TB3064001372	QUOTED	QUOTED	QUOTED	Not Applicable	Not Applicable	Not Applicable		QUOTED	QUOTED

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1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
3.01	SUPPLY- CIRCUIT BREAKER : 420KV, 63KA FOR 1S, 25MM/KV CREEPAGE, 3150A 3PHASE CIRCUIT BREAKER WITHOUT PIR ALONGWITH SUPPORT STRUCTURE, INTERPOLE CABLES, OPERATING MECHANISM, CONTROL BOXESAND ALL ACCESSORIES COMPLETE IN ALL RESPECT	Kurawar (New)-Supply-1	14	NO	TB9064622591	QUOTED	QUOTED	QUOTED	QUOTED	QUOTED	QUOTED		QUOTED	QUOTED
3.02	SUPPLY- CIRCUIT BREAKER : 245KV, 50KA FOR 1S, 25MM/KV CREEPAGE, 3150A 3PHASE CIRCUIT BREAKER WITHOUT PIR ALONGWITH SUPPORT STRUCTURE, INTERPOLE CABLES, OPERATING MECHANISM, CONTROL BOXESAND ALL ACCESSORIES COMPLETE IN ALL RESPECT	Kurawar (New)-Supply-2	1	NO	TB9062522593	QUOTED	QUOTED	QUOTED	QUOTED	QUOTED	QUOTED		QUOTED	QUOTED
3.03	SUPPLY- CIRCUIT BREAKER : 245KV, 50KA FOR 1S, 25MM/KV CREEPAGE, 1600A 3PHASE CIRCUIT BREAKER WITHOUT PIR ALONGWITH SUPPORT STRUCTURE, INTERPOLE CABLES, OPERATING MECHANISM, CONTROL BOXESAND ALL ACCESSORIES COMPLETE IN ALL RESPECT	Kurawar (New)-Supply-3	6	NO	TB9062522601	QUOTED	QUOTED	QUOTED	QUOTED	QUOTED	QUOTED		QUOTED	QUOTED
3.04	SUPPLY- CIRCUIT BREAKER : 145KV, 40KA FOR 1S, 25MM/KV CREEPAGE, 1250A 3PHASE CIRCUIT BREAKER WITHOUT PIR ALONGWITH SUPPORT STRUCTURE, INTERPOLE CABLES, OPERATING MECHANISM, CONTROL BOXESAND ALL ACCESSORIES COMPLETE IN ALL RESPECT	Kurawar (New)-Supply-4	4	NO	TB9061422611	QUOTED	QUOTED	QUOTED	QUOTED	QUOTED	QUOTED		QUOTED	QUOTED
3.05	SUPPLY- CIRCUIT BREAKER : 145KV, 31.5KA FOR 1S, 25MM/KV CREEPAGE, 1250A, 1 PHASE CIRCUIT BREAKER FOR NGR BY PASSING, ALONGWITH SUPPORT STRUCTURE, INTERPOLE CABLES, OPERATING MECHANISM, CONTROL BOXES AND ALL ACCESSORIES COMPLETE IN ALL RESPECT	Kurawar (New)-Supply-5	2	NO	TB9061322085	QUOTED	QUOTED	QUOTED	QUOTED	QUOTED	QUOTED		QUOTED	QUOTED
3.06	SUPPLY- CIRCUIT BREAKER : 72.5KV, 25KA FOR 1S, 25MM/KV CREEPAGE, 1250A 3PHASE CIRCUIT BREAKER WITHOUT PIR ALONGWITH SUPPORT STRUCTURE, INTERPOLE CABLES, OPERATING MECHANISM, CONTROL BOXESAND ALL ACCESSORIES COMPLETE IN ALL RESPECT	Kurawar (New)-Supply-6	1	NO	TB9066222614	QUOTED	QUOTED	QUOTED	QUOTED	QUOTED	QUOTED		QUOTED	QUOTED

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1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
3.07	SUPPLY- CIRCUIT BREAKER : 420KV, CONTROLLED SWITCHING DEVICE FOR 3-PH CIRCUIT BREAKER	Kurawar (New)-Supply-7	8	NO	TB9064001325	QUOTED	QUOTED	QUOTED	QUOTED	QUOTED	QUOTED		QUOTED	QUOTED
3.08	SUPPLY- CIRCUIT BREAKER : SPECIAL CABLES FOR CB / CSD / RP INTERFACING. MODE OF MEASUREMENT SHALL BE CABLE-TRENCH RUNNING LENGTH FROM CIRCUIT BREAKER TO CSD/ RELAY PANEL	Kurawar (New)-Supply-8	1600	MTR	TB9060001333	QUOTED	QUOTED	QUOTED	QUOTED	QUOTED	QUOTED		QUOTED	QUOTED
3.09	SUPPLY- CIRCUIT BREAKER : 400KV, FOUNDATION BOLTS FOR CIRCUIT BREAKER, PLATFORM AND LADDER	Kurawar (New)-Supply-9	42	SET	TB9064001315	QUOTED	QUOTED	QUOTED	QUOTED	QUOTED	QUOTED		QUOTED	QUOTED
3.10	SUPPLY- CIRCUIT BREAKER : 220KV, FOUNDATION BOLTS FOR CIRCUIT BREAKER, PLATFORM AND LADDER	Kurawar (New)-Supply-10	21	SET	TB9062001314	QUOTED	QUOTED	QUOTED	QUOTED	QUOTED	QUOTED		QUOTED	QUOTED
3.11	SUPPLY- CIRCUIT BREAKER : 145KV, FOUNDATION BOLTS FOR CIRCUIT BREAKER, PLATFORM AND LADDER	Kurawar (New)-Supply-11	14	SET	TB9061001315	QUOTED	QUOTED	QUOTED	QUOTED	QUOTED	QUOTED		QUOTED	QUOTED
3.12	SUPPLY- CIRCUIT BREAKER : 72.5KV, FOUNDATION BOLTS FOR CIRCUIT BREAKER, PLATFORM AND LADDER	Kurawar (New)-Supply-12	3	SET	TB9066001316	QUOTED	QUOTED	QUOTED	QUOTED	QUOTED	QUOTED		QUOTED	QUOTED
3.13	SUPPLY- CIRCUIT BREAKER : SF6 GAS FILLING ADOPTER, INCLUDING COUPLING, REGULATOR, CONNECTING HOSE PIPE UP TO GROUND LEVEL	Kurawar (New)-Supply-13	1	LOT	TB9060001356	QUOTED	QUOTED	QUOTED	QUOTED	QUOTED	QUOTED		QUOTED	QUOTED
3.14	SUPPLY- CIRCUIT BREAKER : TRANSDUCERS / FIXTURES REQUIRED FOR TRAVEL MEASUREMENT OF COMPLETE 3-PHASE CB	Kurawar (New)-Supply-14	1	LOT	TB9060001342	QUOTED	QUOTED	QUOTED	QUOTED	QUOTED	QUOTED		QUOTED	QUOTED
3.15	SPARES- CIRCUIT BREAKER : 420KV, 63KA FOR 1S, 25MM/KV CREEPAGE, ONE COMPLETE POLE OF 3150A CB WITHOUT PIR, WITH POLE COLUMN INTERRUPTER, DRIVING MECHANISM AND MARSHALING BOX EXCLUDING SUPPORT STRUCTURE	Kurawar (New)-Supply-15	1	NO	TB8064620544	QUOTED	QUOTED	QUOTED	QUOTED	QUOTED	QUOTED		QUOTED	QUOTED
3.16	SPARES- CIRCUIT BREAKER : 400KV, GRADING CAPACITORS	Kurawar (New)-Supply-16	2	NO	TB8064000685	QUOTED	QUOTED	QUOTED	QUOTED	QUOTED	QUOTED		QUOTED	QUOTED
3.17	SPARES- CIRCUIT BREAKER : 420KV, RUBBER GASKETS, 'O' RINGS AND SEALS	Kurawar (New)-Supply-17	1	SET	TB8064001873	QUOTED	QUOTED	QUOTED	QUOTED	QUOTED	QUOTED		QUOTED	QUOTED
3.18	SPARES- CIRCUIT BREAKER : 400KV, TRIP COILS WITH RESISTOR	Kurawar (New)-Supply-18	2	SET	TB8064000626	QUOTED	QUOTED	QUOTED	QUOTED	QUOTED	QUOTED		QUOTED	QUOTED
3.19	SPARES- CIRCUIT BREAKER : 400KV, CLOSING COILS WITH RESISTOR	Kurawar (New)-Supply-19	1	SET	TB8064000631	QUOTED	QUOTED	QUOTED	QUOTED	QUOTED	QUOTED		QUOTED	QUOTED

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1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
3.20	SPARES- CIRCUIT BREAKER : 400KV, TERMINAL PAD AND CONNECTOR	Kurawar (New)-Supply-20	2	SET	TB8064003251	QUOTED	QUOTED	QUOTED	QUOTED	QUOTED	QUOTED		QUOTED	QUOTED
3.21	SPARES- CIRCUIT BREAKER : 400KV, MOLECULAR FILTER	Kurawar (New)-Supply-21	2	NO	TB8064000652	QUOTED	QUOTED	QUOTED	QUOTED	QUOTED	QUOTED		QUOTED	QUOTED
3.22	SPARES- CIRCUIT BREAKER : 400KV, CORONA RINGS	Kurawar (New)-Supply-22	1	NO	TB8064000674	QUOTED	QUOTED	QUOTED	QUOTED	QUOTED	QUOTED		QUOTED	QUOTED
3.23	SPARES- CIRCUIT BREAKER : 400KV, RELAY POWER CONTACTORS, SWITCH FUSE UNITS, LIMIT SWITCHES, PUSH BUTTON, TIMERS & MCB ETC	Kurawar (New)-Supply-23	1	SET	TB8064001381	QUOTED	QUOTED	QUOTED	QUOTED	QUOTED	QUOTED		QUOTED	QUOTED
3.24	SPARES- CIRCUIT BREAKER : 400KV, PRESSURE SWITCH OF EACH TYPE/DENSITY MONITOR	Kurawar (New)-Supply-24	1	SET	TB8064001393	QUOTED	QUOTED	QUOTED	QUOTED	QUOTED	QUOTED		QUOTED	QUOTED
3.25	SPARES- CIRCUIT BREAKER : 400KV, AUXILIARY SWITCH ASSEMBLY	Kurawar (New)-Supply-25	1	SET	TB8064000896	QUOTED	QUOTED	QUOTED	QUOTED	QUOTED	QUOTED		QUOTED	QUOTED
3.26	SPARES- CIRCUIT BREAKER : 400KV, OPERATION COUNTER	Kurawar (New)-Supply-26	1	NO	TB8064000903	QUOTED	QUOTED	QUOTED	QUOTED	QUOTED	QUOTED		QUOTED	QUOTED
3.27	SPARES- CIRCUIT BREAKER : 400KV, COMPLETE DRIVE MECHANISM	Kurawar (New)-Supply-27	1	SET	TB8064001133	QUOTED	QUOTED	QUOTED	QUOTED	QUOTED	QUOTED		QUOTED	QUOTED
3.28	SPARES- CIRCUIT BREAKER : 400KV, SF6 GAS (EQUIVALENT TO 2 POLES)	Kurawar (New)-Supply-28	1	LOT	TB8064002581	QUOTED	QUOTED	QUOTED	QUOTED	QUOTED	QUOTED		QUOTED	QUOTED
3.29	SPARES- CIRCUIT BREAKER : 220KV, 50KA FOR 1S, 25MM/KV CREEPAGE, ONE COMPLETE POLE OF 1600A CB WITHOUT PIR, WITH POLE COLUMN INTERRUPTER, DRIVING MECHANISM AND MARSHALING BOX EXCLUDING SUPPORT STRUCTURE	Kurawar (New)-Supply-29	1	NO	TB8062522953	QUOTED	QUOTED	QUOTED	QUOTED	QUOTED	QUOTED		QUOTED	QUOTED
3.30	SPARES- CIRCUIT BREAKER : 220KV, RUBBER GASKETS, 'O' RINGS AND SEALS	Kurawar (New)-Supply-30	2	SET	TB8062001875	QUOTED	QUOTED	QUOTED	QUOTED	QUOTED	QUOTED		QUOTED	QUOTED
3.31	SPARES- CIRCUIT BREAKER : 220KV, TRIP COILS WITH RESISTOR	Kurawar (New)-Supply-31	2	SET	TB8062000621	QUOTED	QUOTED	QUOTED	QUOTED	QUOTED	QUOTED		QUOTED	QUOTED
3.32	SPARES- CIRCUIT BREAKER : 220KV, CLOSING COILS WITH RESISTOR	Kurawar (New)-Supply-32	2	SET	TB8062000631	QUOTED	QUOTED	QUOTED	QUOTED	QUOTED	QUOTED		QUOTED	QUOTED
3.33	SPARES- CIRCUIT BREAKER : 220KV, TERMINAL PAD AND CONNECTOR	Kurawar (New)-Supply-33	2	SET	TB8062003251	QUOTED	QUOTED	QUOTED	QUOTED	QUOTED	QUOTED		QUOTED	QUOTED
3.34	SPARES- CIRCUIT BREAKER : 220KV, MOLECULAR FILTER	Kurawar (New)-Supply-34	2	NO	TB8062000653	QUOTED	QUOTED	QUOTED	QUOTED	QUOTED	QUOTED		QUOTED	QUOTED
3.35	SPARES- CIRCUIT BREAKER : 220KV, CORONA RINGS	Kurawar (New)-Supply-35	1	NO	TB8062000672	QUOTED	QUOTED	QUOTED	QUOTED	QUOTED	QUOTED		QUOTED	QUOTED

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1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
3.36	SPARES- CIRCUIT BREAKER : 220KV, RELAY POWER CONTACTORS, SWITCH FUSE UNITS, LIMIT SWITCHES, PUSH BUTTON, TIMERS & MCB ETC	Kurawar (New)-Supply-36	1	SET	TB8062001386	QUOTED	QUOTED	QUOTED	QUOTED	QUOTED	QUOTED		QUOTED	QUOTED
3.37	SPARES- CIRCUIT BREAKER : 220KV, PRESSURE SWITCH OF EACH TYPE/DENSITY MONITOR	Kurawar (New)-Supply-37	1	SET	TB8062001392	QUOTED	QUOTED	QUOTED	QUOTED	QUOTED	QUOTED		QUOTED	QUOTED
3.38	SPARES- CIRCUIT BREAKER : 220KV, AUXILIARY SWITCH ASSEMBLY	Kurawar (New)-Supply-38	1	SET	TB8062000894	QUOTED	QUOTED	QUOTED	QUOTED	QUOTED	QUOTED		QUOTED	QUOTED
3.39	SPARES- CIRCUIT BREAKER : 220KV, OPERATION COUNTER	Kurawar (New)-Supply-39	1	NO	TB8062000902	QUOTED	QUOTED	QUOTED	QUOTED	QUOTED	QUOTED		QUOTED	QUOTED
3.40	SPARES- CIRCUIT BREAKER : 220KV, COMPLETE DRIVE MECHANISM	Kurawar (New)-Supply-40	1	SET	TB8062001134	QUOTED	QUOTED	QUOTED	QUOTED	QUOTED	QUOTED		QUOTED	QUOTED
3.41	SPARES- CIRCUIT BREAKER : 220KV, SF6 GAS (EQUIVALENT TO 2 POLES)	Kurawar (New)-Supply-41	1	LOT	TB8062002584	QUOTED	QUOTED	QUOTED	QUOTED	QUOTED	QUOTED		QUOTED	QUOTED
3.42	SPARES- CIRCUIT BREAKER : 145KV, 40KA FOR 1S, 25MM/KV CREEPAGE, ONE COMPLETE POLE OF 1250A CB WITHOUT PIR, WITH POLE COLUMN, INTERRUPTER, OPERATING MECHANISM, MARSHALLING BOX AND CORONA RING (IF APPLICABLE), EXCLUDING SUPPORT STRUCTURE	Kurawar (New)-Supply-42	1	NO	TB8061423281	QUOTED	QUOTED	QUOTED	QUOTED	QUOTED	QUOTED		QUOTED	QUOTED
3.43	SPARES- CIRCUIT BREAKER : 145KV, RUBBER GASKETS, 'O' RINGS AND SEALS	Kurawar (New)-Supply-43	2	SET	TB8061001873	QUOTED	QUOTED	QUOTED	QUOTED	QUOTED	QUOTED		QUOTED	QUOTED
3.44	SPARES- CIRCUIT BREAKER : 132KV, TRIP COILS WITH RESISTOR	Kurawar (New)-Supply-44	2	SET	TB8061000626	QUOTED	QUOTED	QUOTED	QUOTED	QUOTED	QUOTED		QUOTED	QUOTED
3.45	SPARES- CIRCUIT BREAKER : 132KV, CLOSING COILS WITH RESISTOR	Kurawar (New)-Supply-45	2	SET	TB8061000632	QUOTED	QUOTED	QUOTED	QUOTED	QUOTED	QUOTED		QUOTED	QUOTED
3.46	SPARES- CIRCUIT BREAKER : 145KV, TERMINAL PAD AND CONNECTOR	Kurawar (New)-Supply-46	2	SET	TB8061003251	QUOTED	QUOTED	QUOTED	QUOTED	QUOTED	QUOTED		QUOTED	QUOTED
3.47	SPARES- CIRCUIT BREAKER : 132KV, MOLECULAR FILTER	Kurawar (New)-Supply-47	2	NO	TB8061000656	QUOTED	QUOTED	QUOTED	QUOTED	QUOTED	QUOTED		QUOTED	QUOTED
3.48	SPARES- CIRCUIT BREAKER : 145KV, CORONA RINGS	Kurawar (New)-Supply-48	1	NO	TB8061000674	QUOTED	QUOTED	QUOTED	QUOTED	QUOTED	QUOTED		QUOTED	QUOTED
3.49	SPARES- CIRCUIT BREAKER : 132KV, RELAY POWER CONTACTORS, SWITCH FUSE UNITS, LIMIT SWITCHES, PUSH BUTTON, TIMERS & MCB ETC	Kurawar (New)-Supply-49	1	SET	TB8061001383	QUOTED	QUOTED	QUOTED	QUOTED	QUOTED	QUOTED		QUOTED	QUOTED
3.50	SPARES- CIRCUIT BREAKER : 145KV, PRESSURE SWITCH OF EACH TYPE	Kurawar (New)-Supply-50	1	SET	TB8061003262	QUOTED	QUOTED	QUOTED	QUOTED	QUOTED	QUOTED		QUOTED	QUOTED

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1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
3.51	SPARES- CIRCUIT BREAKER : 132KV, AUXILIARY SWITCH ASSEMBLY	Kurawar (New)-Supply-51	1	SET	TB8061000895	QUOTED	QUOTED	QUOTED	QUOTED	QUOTED	QUOTED		QUOTED	QUOTED
3.52	SPARES- CIRCUIT BREAKER : 145KV, OPERATION COUNTER	Kurawar (New)-Supply-52	1	NO	TB8061000903	QUOTED	QUOTED	QUOTED	QUOTED	QUOTED	QUOTED		QUOTED	QUOTED
3.53	SPARES- CIRCUIT BREAKER : 145KV, COMPLETE DRIVE MECHANISM	Kurawar (New)-Supply-53	1	SET	TB8061001131	QUOTED	QUOTED	QUOTED	QUOTED	QUOTED	QUOTED		QUOTED	QUOTED
3.54	SPARES- CIRCUIT BREAKER : 145KV, SF6 GAS (EQUIVALENT TO 2 POLES)	Kurawar (New)-Supply-54	1	LOT	TB8061002582	QUOTED	QUOTED	QUOTED	QUOTED	QUOTED	QUOTED		QUOTED	QUOTED
3.55	SERVICES- CIRCUIT BREAKER : 420KV, SUPERVISION OF ERECTION, TESTING AND COMMISSIONING OF CIRCUIT BREAKER	Kurawar (New)-Services-1	14	NO	TB3064002543	QUOTED	QUOTED	QUOTED	Not Applicable	Not Applicable	Not Applicable		QUOTED	QUOTED
3.56	SERVICES- CIRCUIT BREAKER : 220KV, SUPERVISION OF ERECTION, TESTING AND COMMISSIONING OF CIRCUIT BREAKER	Kurawar (New)-Services-2	7	NO	TB3062001364	QUOTED	QUOTED	QUOTED	Not Applicable	Not Applicable	Not Applicable		QUOTED	QUOTED
3.57	SERVICES- CIRCUIT BREAKER : 145KV, SUPERVISION OF ERECTION, TESTING AND COMMISSIONING OF CIRCUIT BREAKER	Kurawar (New)-Services-3	4	NO	TB3061001363	QUOTED	QUOTED	QUOTED	Not Applicable	Not Applicable	Not Applicable		QUOTED	QUOTED
3.58	SERVICES- CIRCUIT BREAKER : 145KV, SUPERVISION OF ERECTION, TESTING AND COMMISSIONING OF 1 PHASE CIRCUIT BREAKER	Kurawar (New)-Services-4	2	NO	TB3061003271	QUOTED	QUOTED	QUOTED	Not Applicable	Not Applicable	Not Applicable		QUOTED	QUOTED
3.59	SERVICES- CIRCUIT BREAKER : 72.5KV, SUPERVISION OF ERECTION, TESTING AND COMMISSIONING OF CIRCUIT BREAKER	Kurawar (New)-Services-5	1	NO	TB3066001362	QUOTED	QUOTED	QUOTED	Not Applicable	Not Applicable	Not Applicable		QUOTED	QUOTED
3.60	SERVICES- CIRCUIT BREAKER : 400KV, SUPERVISION OF ERECTION TESTING AND COMMISSIONING OF CONTROLLED SWITCHING DEVICE	Kurawar (New)-Services-6	8	NO	TB3064001372	QUOTED	QUOTED	QUOTED	Not Applicable	Not Applicable	Not Applicable		QUOTED	QUOTED
4.01	SUPPLY- CIRCUIT BREAKER : 420KV, 63KA FOR 1S, 25MM/KV CREEPAGE, 3150A 3PHASE CIRCUIT BREAKER WITHOUT PIR ALONGWITH SUPPORT STRUCTURE, INTERPOLE CABLES, OPERATING MECHANISM, CONTROL BOXESAND ALL ACCESSORIES COMPLETE IN ALL RESPECT	Sujalpur (extn)-Supply-1	3	NO	TB9064622591	QUOTED	QUOTED	QUOTED	QUOTED	QUOTED	QUOTED		QUOTED	QUOTED
4.02	SUPPLY- CIRCUIT BREAKER : 400KV, FOUNDATION BOLTS FOR CIRCUIT BREAKER, PLATFORM AND LADDER	Sujalpur (extn)-Supply-2	9	SET	TB9064001315	QUOTED	QUOTED	QUOTED	QUOTED	QUOTED	QUOTED		QUOTED	QUOTED

Sl. No.	Item Description	Project & supply/ services	Quantity	Units	Material code	Unit Ex-Works RATE In Figures To be entered by the Bidder in Rs. P	GST on Ex-Works (in Percentage)	GST Amount (Unit Rate*Quantity* GST) Rs. P	Unit Freight & Insurance Charges in Rs. P	GST on F&I (in Percentage)	GST Amount on F&I (Unit Rate*Quantity*GST) Rs. P	HSN / SAC Code	TOTAL Ex-Works + F & I AMOUNT excluding GST in Rs. P	TOTAL Ex-Works + F & I AMOUNT including GST in Rs. P
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
4.03	SUPPLY- CIRCUIT BREAKER : SF6 GAS FILLING ADOPTER, INCLUDING COUPLING, REGULATOR, CONNECTING HOSE PIPE UP TO GROUND LEVEL	Sujalpur (extn)-Supply-3	1	LOT	TB9060001356	QUOTED	QUOTED	QUOTED	QUOTED	QUOTED	QUOTED		QUOTED	QUOTED
4.04	SUPPLY- CIRCUIT BREAKER : TRANSDUCERS / FIXTURES REQUIRED FOR TRAVEL MEASUREMENT OF COMPLETE 3-PHASE CB	Sujalpur (extn)-Supply-4	1	LOT	TB9060001342	QUOTED	QUOTED	QUOTED	QUOTED	QUOTED	QUOTED		QUOTED	QUOTED
4.05	SERVICES- CIRCUIT BREAKER : 420KV, SUPERVISION OF ERECTION, TESTING AND COMMISSIONING OF CIRCUIT BREAKER	Sujalpur (extn)-Services-1	3	NO	TB3064002543	QUOTED	QUOTED	QUOTED	Not Applicable	Not Applicable	Not Applicable		QUOTED	QUOTED
5.01	SUPPLY- CIRCUIT BREAKER : 420KV, 63KA FOR 1S, 25MM/KV CREEPAGE, 3150A 3PHASE CIRCUIT BREAKER WITHOUT PIR ALONGWITH SUPPORT STRUCTURE, INTERPOLE CABLES, OPERATING MECHANISM, CONTROL BOXESAND ALL ACCESSORIES COMPLETE IN ALL RESPECT	Ashtha (extn)-Supply-1	4	NO	TB9064622591	QUOTED	QUOTED	QUOTED	QUOTED	QUOTED	QUOTED		QUOTED	QUOTED
5.02	SUPPLY- CIRCUIT BREAKER : 400KV, FOUNDATION BOLTS FOR CIRCUIT BREAKER, PLATFORM AND LADDER	Ashtha (extn)-Supply-2	12	SET	TB9064001315	QUOTED	QUOTED	QUOTED	QUOTED	QUOTED	QUOTED		QUOTED	QUOTED
5.03	SUPPLY- CIRCUIT BREAKER : SF6 GAS FILLING ADOPTER, INCLUDING COUPLING, REGULATOR, CONNECTING HOSE PIPE UP TO GROUND LEVEL	Ashtha (extn)-Supply-3	1	LOT	TB9060001356	QUOTED	QUOTED	QUOTED	QUOTED	QUOTED	QUOTED		QUOTED	QUOTED
5.04	SUPPLY- CIRCUIT BREAKER : TRANSDUCERS / FIXTURES REQUIRED FOR TRAVEL MEASUREMENT OF COMPLETE 3-PHASE CB	Ashtha (extn)-Supply-4	1	LOT	TB9060001342	QUOTED	QUOTED	QUOTED	QUOTED	QUOTED	QUOTED		QUOTED	QUOTED
5.05	SERVICES- CIRCUIT BREAKER : 420KV, SUPERVISION OF ERECTION, TESTING AND COMMISSIONING OF CIRCUIT BREAKER	Ashtha (extn)-Services-1	4	NO	TB3064002543	QUOTED	QUOTED	QUOTED	Not Applicable	Not Applicable	Not Applicable		QUOTED	QUOTED
6.01	SUPPLY- CIRCUIT BREAKER : 420KV, 63KA FOR 1S, 25MM/KV CREEPAGE, 3150A 3PHASE CIRCUIT BREAKER WITHOUT PIR ALONGWITH SUPPORT STRUCTURE, INTERPOLE CABLES, OPERATING MECHANISM, CONTROL BOXESAND ALL ACCESSORIES COMPLETE IN ALL RESPECT	Fatehgarh-III (extn)-Supply-1	3	NO	TB9064622591	QUOTED	QUOTED	QUOTED	QUOTED	QUOTED	QUOTED		QUOTED	QUOTED
6.02	SUPPLY- CIRCUIT BREAKER : 400KV, FOUNDATION BOLTS FOR CIRCUIT BREAKER, PLATFORM AND LADDER	Fatehgarh-III (extn)-Supply-2	9	SET	TB9064001315	QUOTED	QUOTED	QUOTED	QUOTED	QUOTED	QUOTED		QUOTED	QUOTED

Sl. No.	Item Description	Project & supply/ services	Quantity	Units	Material code	Unit Ex-Works RATE In Figures To be entered by the Bidder in Rs. P	GST on Ex-Works (in Percentage)	GST Amount (Unit Rate*Quantity* GST) Rs. P	Unit Freight & Insurance Charges in Rs. P	GST on F&I (in Percentage)	GST Amount on F&I (Unit Rate*Quantity*GST) Rs. P	HSN / SAC Code	TOTAL Ex-Works + F & I AMOUNT excluding GST in Rs. P	TOTAL Ex-Works + F & I AMOUNT including GST in Rs. P
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
6.03	SUPPLY- CIRCUIT BREAKER : SF6 GAS FILLING ADOPTER, INCLUDING COUPLING, REGULATOR, CONNECTING HOSE PIPE UP TO GROUND LEVEL	Fatehgarh-III (extn)-Supply-3	1	LOT	TB9060001356	QUOTED	QUOTED	QUOTED	QUOTED	QUOTED	QUOTED		QUOTED	QUOTED
6.04	SUPPLY- CIRCUIT BREAKER : TRANSDUCERS / FIXTURES REQUIRED FOR TRAVEL MEASUREMENT OF COMPLETE 3-PHASE CB	Fatehgarh-III (extn)-Supply-4	1	SET	TB9060001342	QUOTED	QUOTED	QUOTED	QUOTED	QUOTED	QUOTED		QUOTED	QUOTED
6.05	SERVICES- CIRCUIT BREAKER : 400KV, SUPERVISION OF ERECTION, TESTING AND COMMISSIONING OF CIRCUIT BREAKER	Fatehgarh-III (extn)-Services-1	3	NO	TB3064001364	QUOTED	QUOTED	QUOTED	Not Applicable	Not Applicable	Not Applicable		QUOTED	QUOTED
7.01	SUPPLY- CIRCUIT BREAKER : 145KV, 31.5KA FOR 1S, 25MM/KV CREEPAGE, 1250A, 1 PHASE CIRCUIT BREAKER FOR NGR BY PASSING, ALONGWITH SUPPORT STRUCTURE, INTERPOLE CABLES, OPERATING MECHANISM, CONTROL BOXES AND ALL ACCESSORIES COMPLETE IN ALL RESPECT	Mandsaur (extn)-Supply-1	2	NO	TB9061322085	QUOTED	QUOTED	QUOTED	QUOTED	QUOTED	QUOTED		QUOTED	QUOTED
7.02	SUPPLY- CIRCUIT BREAKER : 145KV, FOUNDATION BOLTS FOR CIRCUIT BREAKER, PLATFORM AND LADDER	Mandsaur (extn)-Supply-2	2	SET	TB9061001315	QUOTED	QUOTED	QUOTED	QUOTED	QUOTED	QUOTED		QUOTED	QUOTED
7.03	SUPPLY- CIRCUIT BREAKER : SF6 GAS FILLING ADOPTER, INCLUDING COUPLING, REGULATOR, CONNECTING HOSE PIPE UP TO GROUND LEVEL	Mandsaur (extn)-Supply-3	1	LOT	TB9060001356	QUOTED	QUOTED	QUOTED	QUOTED	QUOTED	QUOTED		QUOTED	QUOTED
7.04	SUPPLY- CIRCUIT BREAKER : TRANSDUCERS / FIXTURES REQUIRED FOR TRAVEL MEASUREMENT OF COMPLETE 3-PHASE CB	Mandsaur (extn)-Supply-4	1	LOT	TB9060001342	QUOTED	QUOTED	QUOTED	QUOTED	QUOTED	QUOTED		QUOTED	QUOTED
7.05	SERVICES- CIRCUIT BREAKER : 145KV, SUPERVISION OF ERECTION, TESTING AND COMMISSIONING OF 1 PHASE CIRCUIT BREAKER	Mandsaur (extn)-Services-1	2	NO	TB3061003271	QUOTED	QUOTED	QUOTED	Not Applicable	Not Applicable	Not Applicable		QUOTED	QUOTED
8.01	SUPPLY- CIRCUIT BREAKER : SF6 GAS FILLING ADOPTER, INCLUDING COUPLING, REGULATOR, CONNECTING HOSE PIPE UP TO GROUND LEVEL	Sirohi (extn)-Supply-1	1	LOT	TB9060001356	QUOTED	QUOTED	QUOTED	QUOTED	QUOTED	QUOTED		QUOTED	QUOTED
8.02	SUPPLY- CIRCUIT BREAKER : TRANSDUCERS / FIXTURES REQUIRED FOR TRAVEL MEASUREMENT OF COMPLETE 3-PHASE CB	Sirohi (extn)-Supply-2	1	LOT	TB9060001342	QUOTED	QUOTED	QUOTED	QUOTED	QUOTED	QUOTED		QUOTED	QUOTED

Sl. No.	Item Description	Project & supply/ services	Quantity	Units	Material code	Unit Ex-Works RATE In Figures To be entered by the Bidder in Rs. P	GST on Ex-Works (in Percentage)	GST Amount (Unit Rate*Quantity* GST) Rs. P	Unit Freight & Insurance Charges in Rs. P	GST on F&I (in Percentage)	GST Amount on F&I (Unit Rate*Quantity*GST) Rs. P	HSN / SAC Code	TOTAL Ex-Works + F & I AMOUNT excluding GST in Rs. P	TOTAL Ex-Works + F & I AMOUNT including GST in Rs. P
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
8.03	SUPPLY- CIRCUIT BREAKER : 145KV, 31.5KA FOR 1S, 25MM/KV CREEPAGE, 1250A, 1 PHASE CIRCUIT BREAKER FOR NGR BY PASSING, ALONGWITH SUPPORT STRUCTURE, INTERPOLE CABLES, OPERATING MECHANISM, CONTROL BOXES AND ALL ACCESSORIES COMPLETE IN ALL RESPECT	Sirohi (extn)-Supply-3	2	NO	TB9061322085	**QUOTED**	**QUOTED**	**QUOTED**	**QUOTED**	**QUOTED**	**QUOTED**		**QUOTED**	**QUOTED**
8.04	SERVICES- CIRCUIT BREAKER : 145KV, SUPERVISION OF ERECTION, TESTING AND COMMISSIONING OF CIRCUIT BREAKER	Sirohi (extn)-Services-1	2	NO	TB3061001363	**QUOTED**	**QUOTED**	**QUOTED**	**Not Applicable**	**Not Applicable**	**Not Applicable**		**QUOTED**	**QUOTED**
8.05	SUPPLY- CIRCUIT BREAKER : 145KV, FOUNDATION BOLTS FOR CIRCUIT BREAKER, PLATFORM AND LADDER	Sirohi (extn)-Supply-4	2	SET	TB9061001315	**QUOTED**	**QUOTED**	**QUOTED**	**QUOTED**	**QUOTED**	**QUOTED**		**QUOTED**	**QUOTED**
Total in Figures													**QUOTED**	**QUOTED**

PROJECT:	**SUPPLY AND SUPERVISION OF ETC OF CIRCUIT BREAKERS (PACKAGE-I&II) FOR VARIOUS POWERGRID PROJECTS- Mandsaur (new), Indore (Extn), Barmer-I (New), Sirohi (Extn), Kurawar (New), Mandsaur (Extn), Fatehgarh-III (Extn), Shujalpur (Extn) & Ashtha (Extn).**
ITEM:	**CIRCUIT BREAKER**
ENQUIRY No.	

ANNE URE-I (A)

TECHNICAL PRE-QUALIFYING CRITERIA FOR PACKAGE-I 765kV Circuit Breakers

Annexure-TQR

TECHNICAL PRE-QUALIFICATION REQUIREMENT FOR 765kV CIRCUIT BREAKER

Name of Projects:

1. **765kV AIS Pkg SS-46T** for (a) Establishment of 765/400/220kV Barmer-I including 400kV, 2x125 MVAr Reactor; (b) Extn at 765kV Sirohi for termination of Barmer-I PS– Sirohi PS 765 kV D/c line; (c) Extn of 400kV Fatehgarh-III for termination of Fatehgarh-III (Section-2) PS – Barmer-I PS 400 kV D/c line.

2. **765kV AIS Pkg SS-47T** for (a) Establishment of 765/400/220/132kV Kurawar Substation (New) including 1x125MVAr 420kV (3-Ph)Bus Reactor, (b) Extn of 400kV Shujalpur for termination of 400kVD/C Shujalpur – Kurawar TL, (c) Extn of 400kV Ashtha S/s for LILO of one circuit of Indore-Itarsi 400 kV D/c line at Ashtha & for termination of Kurawar-Ashtha 400 kV D/c line and (d) Extn of 765kV Mandsaur for termination of Mandsaur – Kurawar 765 kV D/c line.

3. **Substation Package SS43T** for (a) Establishment of 765/400/ 220kV Mandsaur S/s and (b) Extn. of 765kV Indore (PG) for termination of Mandsaur PS – Indore (PG) 765 kV D/c Line associated with "Transmission system for evacuation of power from Rajasthan REZ Ph-IV (Part-2 : 5.5GW) Jaisalmer/Barmer Complex)Part-C"

Name of Customer: POWERGRID

Technical Pre-Qualification requirement for 765kV Circuit Breaker

i. The manufacturer(s) whose 765kV Circuit Breaker(s) are offered, must have, manufactured, type tested (as per IEC/IS or equivalent standard) and supplied 715kV or higher voltage class Circuit Breaker(s), which are in satisfactory operation# for atleast two (2) years as on 09.07.2024

ii. Alternatively, the manufacturer, who have established manufacturing and testing facilities in India for the offered Circuit Breaker and not meeting the requirement stipulated in (i) above, can also be considered provided that

   a. 715kV or higher Voltage class Circuit Breaker(s) must have been manufactured in the above Indian works & type tested (as per IEC/IS standard) and supplied as on the date of 09.07.2024.

   b. In case manufacturer meets the technical requirement through clause (ii) above, warranty obligations for additional warranty of two (2) years over & above the warranty period as specified in the bidding documents shall be applicable for the entire quantity of the offered Circuit Breaker(s) to be supplied under the contract. Further, contractor shall furnish performance guarantee for an amount of 10% of the ex-works cost of the Circuit Breaker(s) for the additional warranty period in addition to the contract performance guarantee to be submitted by the contractor.

#: satisfactory operation means certificate issued by the Employer/Utility certifying the operation without any adverse remark.

PROJECT:	**SUPPLY AND SUPERVISION OF ETC OF CIRCUIT BREAKERS (PACKAGE-I&II) FOR VARIOUS POWERGRID PROJECTS- Mandsaur (new), Indore (Extn), Barmer-I (New), Sirohi (Extn), Kurawar (New), Mandsaur (Extn), Fatehgarh-III (Extn), Shujalpur (Extn) & Ashtha (Extn).**
ITEM:	**CIRCUIT BREAKER**
ENQUIRY No.	

Annexure-TQR

SUPPORTING DOCUMENTS TO BE SUBMITTED BY BIDDER ALONG WITH TECHNICAL BID		
Sr	**Required Criteria**	**Supporting Documents**
1	Manufacturing	Approved Drawings / GTP / Approved Quality Plan / Factory Inspection Test Report etc. establishing bidder as manufacturer of offered item in line with TQR
2	Supply	PO / Dispatch clearance / LR / Material Receipt certificate at site / installation or commissioning certificate etc. establishing bidder as proven supplier of offered item in line with TQR
3	Type Test	TTR approval from customer / Type Test Report etc. establishing successful type tested design in line with TQR
4	Successful operation	Successful operation means certificate issued by employer/end-customer (along with chain of document from employer/end-customer) stating successful operation without any adverse remark.
5	Any other document if specifically called in TQR	Any other document if specifically called in TQR

Signature of the authorized representative of

Place : .....
Date : .....

Bidder's Name : .....
Designation : .....
Company Seal : .....

PROJECT:	**SUPPLY AND SUPERVISION OF ETC OF CIRCUIT BREAKERS (PACKAGE-I&II) FOR VARIOUS POWERGRID PROJECTS- Mandsaur (new), Indore (Extn), Barmer-I (New), Sirohi (Extn), Kurawar (New), Mandsaur (Extn), Fatehgarh-III (Extn), Shujalpur (Extn) & Ashtha (Extn).**
ITEM:	**CIRCUIT BREAKER**
ENQUIRY No.	

ANNEXURE-I (B)

TECHNICAL PRE-QUALIFYING CRITERIA FOR PACKAGE-II [400kV & below rating Circuit Breakers]

Annexure-TQR

TECHNICAL PRE-QUALIFICATION REQUIREMENT FOR 400/220/132kV* CIRCUIT BREAKER

Name of Projects:

1. **765kV AIS Pkg SS-46T** for (a) Establishment of 765/400/220kV Barmer-I including 400kV, 2x125 MVAr Reactor; (b) Extn at 765kV Sirohi for termination of Barmer-I PS– Sirohi PS 765 kV D/c line; (c) Extn of 400kV Fatehgarh-III for termination of Fatehgarh-III (Section-2) PS – Barmer-I PS 400 kV D/c line.

2. **765kV AIS Pkg SS-47T** for (a) Establishment of 765/400/220/132kV Kurawar Substation (New) including 1x125MVAr 420kV (3-Ph)Bus Reactor, (b) Extn of 400kV Shujalpur for termination of 400kVD/C Shujalpur – Kurawar TL, (c) Extn of 400kV Ashtha S/s for LILO of one circuit of Indore-Itarsi 400 kV D/c line at Ashtha & for termination of Kurawar-Ashtha 400 kV D/c line and (d) Extn of 765kV Mandsaur for termination of Mandsaur – Kurawar 765 kV D/c line.

3. **Substation Package SS43T** for (a) Establishment of 765/400/ 220kV Mandsaur S/s and (b) Extn. of 765kV Indore (PG) for termination of Mandsaur PS – Indore (PG) 765 kV D/c Line associated with "Transmission system for evacuation of power from Rajasthan REZ Ph-IV (Part-2 : 5.5GW) Jaisalmer/Barmer Complex)Part-C"

Name of Customer: POWERGRID

Technical Pre-Qualification requirement for 400/220/132kV Circuit Breaker*

i. The manufacturer(s) whose 400/220/132kV* Circuit Breaker(s) are offered, must have, manufactured, type tested (as per IEC/IS or equivalent standard) and supplied 345/220/132kV* or higher voltage class Circuit Breaker(s), which are in satisfactory operation# for atleast two (2) years as on 09.07.2024

ii. Alternatively, the manufacturer, who have established manufacturing and testing facilities in India for the offered Circuit Breaker and not meeting the requirement stipulated in (i) above, can also be considered provided that

   a. 345/220/132kV* or higher Voltage class Circuit Breaker(s) must have been manufactured in the above Indian works & type tested (as per IEC/IS standard) and supplied as on the date of 09.07.2024

   b. In case manufacturer meets the technical requirement through clause (ii) above, warranty obligations for additional warranty of two (2) years over & above the warranty period as specified in the bidding documents shall be applicable for the entire quantity of the offered Circuit Breaker(s) to be supplied under the contract. Further, contractor shall furnish performance guarantee for an amount of 10% of the ex-works cost of the Circuit Breaker(s) for the additional warranty period in addition to the contract performance guarantee to be submitted by the contractor.

#: satisfactory operation means certificate issued by the Employer/Utility certifying the operation without any adverse remark.
***: voltage class of respective circuit breaker as applicable.**

PROJECT:	**SUPPLY AND SUPERVISION OF ETC OF CIRCUIT BREAKERS (PACKAGE-I&II) FOR VARIOUS POWERGRID PROJECTS- Mandsaur (new), Indore (Extn), Barmer-I (New), Sirohi (Extn), Kurawar (New), Mandsaur (Extn), Fatehgarh-III (Extn), Shujalpur (Extn) & Ashtha (Extn).**
ITEM:	**CIRCUIT BREAKER**
ENQUIRY No.	

SUPPORTING DOCUMENTS TO BE SUBMITTED BY BIDDER ALONG WITH TECHNICAL BID		
Sr	**Required Criteria**	**Supporting Documents**
1	Manufacturing	Approved Drawings / GTP / Approved Quality Plan / Factory Inspection Test Report etc. establishing bidder as manufacturer of offered item in line with TQR
2	Supply	PO / Dispatch clearance / LR / Material Receipt certificate at site / installation or commissioning certificate etc. establishing bidder as proven supplier of offered item in line with TQR

Annexure-TQR

3	Type Test	TTR approval from customer / Type Test Report etc. establishing successful type tested design in line with TQR
4	Successful operation	Successful operation means certificate issued by employer/end-customer (along with chain of document from employer/end-customer) stating successful operation without any adverse remark.
5	Any other document if specifically called in TQR	Any other document if specifically called in TQR

Signature of the authorized representative of

Place : .....
Date : .....

Bidder's Name : .....
Designation : .....
Company Seal : .....

PROJECT:	**SUPPLY AND SUPERVISION OF ETC OF CIRCUIT BREAKERS (PACKAGE-I&II) FOR VARIOUS POWERGRID PROJECTS- Mandsaur (new), Indore (Extn), Barmer-I (New), Sirohi (Extn), Kurawar (New), Mandsaur (Extn), Fatehgarh-III (Extn), Shujalpur (Extn) & Ashtha (Extn).**
ITEM:	**CIRCUIT BREAKERS**
ENQUIRY No.	

ANNEXURE-I (C)

FINANCIAL PRE-QUALIFYING CRITERIA

1. PACKAGE-I

(i) Bidder should have a minimum average audited annual turnover / Sales* Value of **INR 17 Crores** for last three financial years 2021-22, 2022-23 & 2023-24

(ii) Bidder should have earned profit in at least one year during the last three years for which turnover has been considered.

2. PACKAGE-II

(i) Bidder should have a minimum average audited annual turnover / Sales* Value of **INR 7 Crores** for last three financial years 2021-22, 2022-23 & 2023-24

(ii) Bidder should have earned profit in at least one year during the last three years for which turnover has been considered.

3. COMBINE PACKAGE-I &II

(i) Bidder should have a minimum average audited annual turnover / Sales* Value of **INR 24 Crores** for last three financial years 2021-22, 2022-23 & 2023-24.

(ii) Bidder should have earned profit in at least one year during the last three years for which turnover has been considered.

Note:

*** Audited Profit & Loss Account and Balance Sheet of relevant financial years as per PQR must be submitted as proof of Average Annual Turnover/Sales. The Financial statements must be signed by the owner/director and the auditor. Auditors seal, Name, Membership No., Firm Registration No. & firm name (if applicable), UDIN and the capacity in which he is signing (Proprietor/Partner), must be mentioned on the Profit & Loss A/c and Balance Sheet.**

PROJECT:	**SUPPLY AND SUPERVISION OF ETC OF CIRCUIT BREAKERS (PACKAGE-I&II) FOR VARIOUS POWERGRID PROJECTS- Mandsaur (new), Indore (Extn), Barmer-I (New), Sirohi (Extn), Kurawar (New), Mandsaur (Extn), Fatehgarh-III (Extn), Shujalpur (Extn) & Ashtha (Extn).**
ITEM:	**CIRCUIT BREAKERS**
ENQUIRY No.	

BIDDER TO FURNISH DETAILS IN BELOW FORMAT AND SHOULD SUBMIT AUDITED BALANCE SHEET AND PROFIT & LOSS ACCOUNT SHEET OF THESE YEARS.

FINANCIAL PQR

Bid details		
1	**Bid submitted for:**	**PACKAGE-I/ PACKAGE-II/ PACKAGE- I& II BOTH**
Turnover details		
Sl. No.	**Financial year**	**Turnover (in Lakhs)**
1	2021-2022	
2	2022-2023	
3	2023-2024	
	Average annual Turnover for above financial years	
Profit		
1	Whether bidder has earned profit in at least one year during the last three years for which turnover has been considered.	**Yes/ No**

Signature of the authorized representative of

Place : ……..
Date : ……..

Bidder's Name : ……
Designation : ……
Company Seal : ……

ANNEXURE-II (A)

Activity Schedule for Package-I [765kV Circuit Breakers]
[For PGCIL Mandsaur (new) and Indore (extn)]

		Mandsaur (new)	Indore (extn)	
A. Supply	**Brief Description of work**	**ACTIVITY TIME IN WEEKS**	**ACTIVITY TIME IN WEEKS**	**Responsibility**
1	Inputs to vendor from BHEL after issue of PO	1 Week	1 Week	BHEL scope.
2	Submission of Documents necessary for getting manufacturing clearance like Drawings, Data sheet, Type test reports, Spare BOQ etc.	2 Weeks	2 Weeks	Supplier scope.
3	Review and Approval of documents from BHEL/Customer and issue of manufacturing clearance.	2 Weeks	2 Weeks	BHEL scope.
4	Manufacturing time (after Manufacturing Clearance from BHEL) along with Inspection Call (ie. Time from Manufacturing Clearance date and inspection date mentioned in inspection call)	31 Weeks	23 Weeks	Supplier scope.
5	BHEL/ customer Inspection & dispatch clearance	2 Weeks	2 Weeks	BHEL scope
6	Dispatch	2 Weeks	2 Weeks	Supplier scope
	Total time for supply	**40 Weeks**	**32 Weeks**	

Note:	1.Supplier must ensure the completeness and correctness of the requisite drawings/documents before submission for approval. 2. Supplier to ensure every revised drawing/ document submission incorporating comments within 1 weeks from the date of comments by BHEL, else vendor delay shall be deducted from manufacturing time. 3. Inspection call should be raised Two (02) weeks in advance before inspection date. Inspection call should be given in the prescribed format only (enclosed). Inspection calls not in the prescribed format shall not be entertained. 4.Delay in activity pertaining to BHEL, not attributable to vendor, as listed above shall be added, if required in case of time extension and Delivery date will be re-fixed accordingly based on bidder's request & delay analysis. 5. Supplier to give monthly plan for delivery of equipment matching the site requirement and manufacturing time as per sl. no. 5 of activity schedule. 6. Foundation bolts to be supplied within 03 months from the date of PO.

B. Services	**Brief Description of work**			**Responsibility**
1	Deputation of service engineer for the supervision of ETC work			Supplier scope

Note:	1.Supplier must ensure the deputation of service engineer at site within one week from the date of confirmation mail from BHEL.

Signature of the authorized representative of

Place : .....
Date : .....

Bidder's Name : .....
Designation : .....
Company Seal : .....

ANNEXURE-II (B)

Activity Schedule for Package-I [765kV Circuit Breakers]
[For PGCIL Kurawar (new), Mandsaur (extn), Sujalpur (extn) and Ashtha (extn)]

		Kurawar (new)	Mandsaur (extn)	
A. Supply	**Brief Description of work**	**ACTIVITY TIME IN WEEKS**	**ACTIVITY TIME IN WEEKS**	**Responsibility**
1	Inputs to vendor from BHEL after issue of PO	1 Week	1 Week	BHEL scope.
2	Submission of Documents necessary for getting manufacturing clearance like Drawings, Data sheet, Type test reports, Spare BOQ etc.	2 Weeks	2 Weeks	Supplier scope.
3	Review and Approval of documents from BHEL/Customer and issue of manufacturing clearance.	2 Weeks	2 Weeks	BHEL scope.
4	Manufacturing time (after Manufacturing Clearance from BHEL) along with Inspection Call (ie. Time from Manufacturing Clearance date and inspection date mentioned in inspection call)	43 Weeks	35 Weeks	Supplier scope.
5	BHEL/ customer Inspection & dispatch clearance	2 Weeks	2 Weeks	BHEL scope
6	Dispatch	2 Weeks	2 Weeks	Supplier scope
	Total time for supply	**52 Weeks**	**44 Weeks**	

Note:	1.Supplier must ensure the completeness and correctness of the requisite drawings/documents before submission for approval. 2. Supplier to ensure every revised drawing/ document submission incorporating comments within 1 weeks from the date of comments by BHEL, else vendor delay shall be deducted from manufacturing time. 3. Inspection call should be raised Two (02) weeks in advance before inspection date. Inspection call should be given in the prescribed format only (enclosed). Inspection calls not in the prescribed format shall not be entertained. 4.Delay in activity pertaining to BHEL, not attributable to vendor, as listed above shall be added, if required in case of time extension and Delivery date will be re-fixed accordingly based on bidder's request & delay analysis. 5. Supplier to give monthly plan for delivery of equipment matching the site requirement and manufacturing time as per sl. no. 5 of activity schedule. 6. Foundation bolts to be supplied within 03 months from the date of PO.

B. Services	**Brief Description of work**			**Responsibility**
1	Deputation of service engineer for the supervision of ETC work			Supplier scope

Note:	1.Supplier must ensure the deputation of service engineer at site within one week from the date of confirmation mail from BHEL.

Signature of the authorized representative of

Place : .....
Date : .....

Bidder's Name : .....
Designation : .....
Company Seal : .....

ANNEXURE-II (C)

Activity Schedule for Package-I [765kV Circuit Breakers]
[For PGCIL Barmer-I (new), Sirohi (extn) and Fatehgarh-III (extn)]

		Barmer-I (new)	Sirohi (extn)	
A. Supply	**Brief Description of work**	**ACTIVITY TIME IN WEEKS**	**ACTIVITY TIME IN WEEKS**	**Responsibility**
1	Inputs to vendor from BHEL after issue of PO	1 Week	1 Week	BHEL scope.
2	Submission of Documents necessary for getting manufacturing clearance like Drawings, Data sheet, Type test reports, Spare BOQ etc.	2 Weeks	2 Weeks	Supplier scope.
3	Review and Approval of documents from BHEL/Customer and issue of manufacturing clearance.	2 Weeks	2 Weeks	BHEL scope.
4	Manufacturing time (after Manufacturing Clearance from BHEL) along with Inspection Call (ie. Time from Manufacturing Clearance date and inspection date mentioned in inspection call)	51 Weeks	47 Weeks	Supplier scope.
5	BHEL/ customer Inspection & dispatch clearance	2 Weeks	2 Weeks	BHEL scope
6	Dispatch	2 Weeks	2 Weeks	Supplier scope
	Total time for supply	**60 Weeks**	**56 Weeks**	

Note:	1.Supplier must ensure the completeness and correctness of the requisite drawings/documents before submission for approval. 2. Supplier to ensure every revised drawing/ document submission incorporating comments within 1 weeks from the date of comments by BHEL, else vendor delay shall be deducted from manufacturing time. 3. Inspection call should be raised Two (02) weeks in advance before inspection date. Inspection call should be given in the prescribed format only (enclosed). Inspection calls not in the prescribed format shall not be entertained. 4.Delay in activity pertaining to BHEL, not attributable to vendor, as listed above shall be added, if required in case of time extension and Delivery date will be re-fixed accordingly based on bidder's request & delay analysis. 5. Supplier to give monthly plan for delivery of equipment matching the site requirement and manufacturing time as per sl. no. 5 of activity schedule. 6. Foundation bolts to be supplied within 03 months from the date of PO.

B. Services	**Brief Description of work**			**Responsibility**
1	Deputation of service engineer for the supervision of ETC work			Supplier scope

Note:	1.Supplier must ensure the deputation of service engineer at site within one week from the date of confirmation mail from BHEL.

Signature of the authorized representative of

Place : .....
Date : .....

Bidder's Name : .....
Designation : .....
Company Seal : .....

ANNEXURE-II (D)

Activity Schedule for Package-II [400kV & below rating Circuit Breakers]
[For PGCIL Mandsaur (new) and Indore (extn)]

		Mandsaur (new)	
A. Supply	**Brief Description of work**	**ACTIVITY TIME IN WEEKS**	**Responsibility**
1	Inputs to vendor from BHEL after issue of PO	1 Week	BHEL scope.
2	Submission of Documents necessary for getting manufacturing clearance like Drawings, Data sheet, Type test reports, Spare BOQ etc.	2 Weeks	Supplier scope.
3	Review and Approval of documents from BHEL/Customer and issue of manufacturing clearance.	2 Weeks	BHEL scope.
4	Manufacturing time (after Manufacturing Clearance from BHEL) along with Inspection Call (ie. Time from Manufacturing Clearance date and inspection date mentioned in inspection call)	23 Weeks	Supplier scope.
5	BHEL/ customer Inspection & dispatch clearance	2 Weeks	BHEL scope
6	Dispatch	2 Weeks	Supplier scope
	Total time for supply	**32 Weeks**	

Note:	1.Supplier must ensure the completeness and correctness of the requisite drawings/documents before submission for approval. 2. Supplier to ensure every revised drawing/ document submission incorporating comments within 1 weeks from the date of comments by BHEL, else vendor delay shall be deducted from manufacturing time. 3. Inspection call should be raised Two (02) weeks in advance before inspection date. Inspection call should be given in the prescribed format only (enclosed). Inspection calls not in the prescribed format shall not be entertained. 4.Delay in activity pertaining to BHEL, not attributable to vendor, as listed above shall be added, if required in case of time extension and Delivery date will be re-fixed accordingly based on bidder's request & delay analysis. 5. Supplier to give monthly plan for delivery of equipment matching the site requirement and manufacturing time as per sl. no. 5 of activity schedule. 6. Foundation bolts to be supplied within 03 months from the date of PO.

B. Services	**Brief Description of work**		**Responsibility**
1	Deputation of service engineer for the supervision of ETC work		Supplier scope

Note:	1.Supplier must ensure the deputation of service engineer at site within one week from the date of confirmation mail from BHEL.

Place : ……..
Date : ……..

: ……
: ……
: ……

ANNEXURE-II (E)

Activity Schedule for Package-II [400kV & below rating Circuit Breakers]
[For PGCIL Kurawar (new), Mandsaur (extn), Sujalpur (extn) and Ashtha (extn)]

		Kurawar (new)	Mandsaur (extn)	Sujalpur (extn)	Ashtha (extn)	
A. Supply	**Brief Description of work**	**ACTIVITY TIME IN WEEKS**	**ACTIVITY TIME IN WEEKS**	**ACTIVITY TIME IN WEEKS**	**ACTIVITY TIME IN WEEKS**	**Responsibility**
1	Inputs to vendor from BHEL after issue of PO	1 Week	1 Week	1 Week	1 Week	BHEL scope.
2	Submission of Documents necessary for getting manufacturing clearance like Drawings, Data sheet, Type test reports, Spare BOQ etc.	2 Weeks	2 Weeks	2 Weeks	2 Weeks	Supplier scope.
3	Review and Approval of documents from BHEL/Customer and issue of manufacturing clearance.	2 Weeks	2 Weeks	2 Weeks	2 Weeks	BHEL scope.
4	Manufacturing time (after Manufacturing Clearance from BHEL) along with Inspection Call (ie. Time from Manufacturing Clearance date and inspection date mentioned in inspection call)	35 Weeks	35 Weeks	31 Weeks	31 Weeks	Supplier scope.
5	BHEL/ customer Inspection & dispatch clearance	2 Weeks	2 Weeks	2 Weeks	2 Weeks	BHEL scope
6	Dispatch	2 Weeks	2 Weeks	2 Weeks	2 Weeks	Supplier scope
	Total time for supply	**44 Weeks**	**44 Weeks**	**40 Weeks**	**40 Weeks**	

Note:	1.Supplier must ensure the completeness and correctness of the requisite drawings/documents before submission for approval. 2. Supplier to ensure every revised drawing/ document submission incorporating comments within 1 weeks from the date of comments by BHEL, else vendor delay shall be deducted from manufacturing time. 3. Inspection call should be raised Two (02) weeks in advance before inspection date. Inspection call should be given in the prescribed format only (enclosed). Inspection calls not in the prescribed format shall not be entertained. 4.Delay in activity pertaining to BHEL, not attributable to vendor, as listed above shall be added, if required in case of time extension and Delivery date will be re-fixed accordingly based on bidder's request & delay analysis. 5. Supplier to give monthly plan for delivery of equipment matching the site requirement and manufacturing time as per sl. no. 5 of activity schedule. 6. Foundation bolts to be supplied within 03 months from the date of PO.

B. Services	**Brief Description of work**					**Responsibility**
1	Deputation of service engineer for the supervision of ETC work					Supplier scope

Note:	1.Supplier must ensure the deputation of service engineer at site within one week from the date of confirmation mail from BHEL.

Signature of the authorized representative of

Place : .....
Date : .....

Bidder's Name : .....
Designation : .....
Company Seal : .....

ANNEXURE-II (F)

Activity Schedule for Package-II [400kV & below rating Circuit Breakers]
[For PGCIL Barmer-I (new), Sirohi (extn) and Fatehgarh-III (extn)]

		Barmer-I (new)	Sirohi (extn)	Fatehgarh-III (extn)	
A. Supply	**Brief Description of work**	**ACTIVITY TIME IN WEEKS**	**ACTIVITY TIME IN WEEKS**	**ACTIVITY TIME IN WEEKS**	**Responsibility**
1	Inputs to vendor from BHEL after issue of PO	1 Week	1 Week	1 Week	BHEL scope.
2	Submission of Documents necessary for getting manufacturing clearance like Drawings, Data sheet, Type test reports, Spare BOQ etc.	2 Weeks	2 Weeks	2 Weeks	Supplier scope.
3	Review and Approval of documents from BHEL/Customer and issue of manufacturing clearance.	2 Weeks	2 Weeks	2 Weeks	BHEL scope.
4	Manufacturing time (after Manufacturing Clearance from BHEL) along with Inspection Call (ie. Time from Manufacturing Clearance date and inspection date mentioned in inspection call)	43 Weeks	39 Weeks	39 Weeks	Supplier scope.
5	BHEL/ customer Inspection & dispatch clearance	2 Weeks	2 Weeks	2 Weeks	BHEL scope
6	Dispatch	2 Weeks	2 Weeks	2 Weeks	Supplier scope
	Total time for supply	**52 Weeks**	**48 Weeks**	**48 Weeks**	

Note:	1.Supplier must ensure the completeness and correctness of the requisite drawings/documents before submission for approval. 2. Supplier to ensure every revised drawing/ document submission incorporating comments within 1 weeks from the date of comments by BHEL, else vendor delay shall be deducted from manufacturing time. 3. Inspection call should be raised Two (02) weeks in advance before inspection date. Inspection call should be given in the prescribed format only (enclosed). Inspection calls not in the prescribed format shall not be entertained. 4.Delay in activity pertaining to BHEL, not attributable to vendor, as listed above shall be added, if required in case of time extension and Delivery date will be re-fixed accordingly based on bidder's request & delay analysis. 5. Supplier to give monthly plan for delivery of equipment matching the site requirement and manufacturing time as per sl. no. 5 of activity schedule. 6. Foundation bolts to be supplied within 03 months from the date of PO.

B. Services	**Brief Description of work**				**Responsibility**
1	Deputation of service engineer for the supervision of ETC work				Supplier scope

Note:	1.Supplier must ensure the deputation of service engineer at site within one week from the date of confirmation mail from BHEL.

Signature of the authorized representative of

Place : .....
Date : .....

Bidder's Name : .....
Designation : .....
Company Seal : .....

Annexure-III

Check List for Supply bills

Name Of the Project							
Package Description							
Invoice No. & Date							
PO No. & date							
Sr. No	Documents Required	Copies	Check Points	Page no.	Vendor Remarks (Y/N/NA)	Verification by MM (Y/N/NA)	Verification by Fin (Y/N/NA)
1	Original for Buyer Invoice - GST compliant invoice	1 Original+2 Copy	1. Please ensure GST complaint invoice in original				
			2. Consignee address : BHEL C/o followed by site address				
			3. Item description and unit of quantity are matched with PO				
			4. Buyer address and GSTN No as required (TBG Noida or Nodal agency)				
			5. PO No and date, LR No and date, Vehicle No and Project name are				
			6. Invoiced quantity are not more than th PO quantity and MICC quantity				
			7. Ex works unit rate , Taxes and F&I rates are same as per PO				
			8. Signed and stamped by vendor				
2	Receipted LR (signed & stamped)/ confirmation from site regarding receipt of packages/ Boxes	1Orignal+2 Copy	1. Consignee address : BHEL C/o followed by Site address				
			2. In case of material purchased from sub vendor , Consignee address Vendor's name C/o BHEL C/o Site address				
			3. Vendor's Invoice no and Vehicle No are mentioned				
			4. No of boxes/No of packages are same as per Packing list				
			5. In case of and adverse remark on LR (Like shortages/damages/broken etc) , clarification from site/TBMM/TBCM is nedded				
			6. LR is readable				
			7. In case of photo copy, LR is verified by TBMM				
			8. LR date is after the date of MICC/(MDCC if issued) or same date				
3	Packing List - showing number of packages, and gross weight/net Weight (if applicable)	1Orignal+2 Copy	1. PO No and date, LR No and date, Invoice No and date, Site Name and address, Consignor and consignee address are mentior				
			2. Item description and quantity are matched with Invoice and PO				
			3. Signed and stamped by vendor				
			4. No of packages/ Item descriptions are matched with MRC and LR				
4	MICC from BHEL	1Original+2Copy	1. BHEL MICC has been issued prior to the date of dispatch or on same date				
			2. In case where MICC date is after the date of dispatch then MDCC date is same or prior to the date of dispatcl				
			3. Project Name, PO,Po Date, Vendor's name and address is correct				
			4. Item description, Quantity and unit of quantity are same as per PO and				
			5. All hold point in MICC , if any, have been resolved before submission of bill				
			6. Signed and stamped by BHEL Executive				
			7. MICC and MDCC quantity are not less than Invoice quantity and cover all invoiced items.				
5	Guarantee Certificate	1 Original+2 Copy	1. Project Name, PO No., Invoice No , LR No and date are mentioned .				
			2. Guarantee Certificate is strictly matched with PO T&C				
			3. Signed and stamped by vendor				
6	Bank Guarantee	1 Copy	'1. Ensure submission of BG directly from Bank before supply of material so that BG confirmation may be arranged before processing the bill				
			2. Bill can be processed only after receipt of BG confirmation directly from bank				
			3. It should be in the name of BHEL , TBG Noida with registered office address Siri Fort, New Delt				
			4. It should be in prescribed format.				
			5. BG value and valdity plus claim period should be minimum as specified in PO / RC. Please check before supply , If BG extension is required please arrange the sam				
			6. Vendor's name address should be same as per PO				
			7. Po No / RC No and date should be correct				
7	Insurance Certifcate	1 Orignal+2 Copy	1. Invoice No and date, Vendor's Name,Place from Consignor to Consignee are mentioned				
			2. It has not been issued later than the LR date				
			3. Insured value is not less than the Invoice value				
			4. Signed and stamped by Insurance Company				
			5. In case of Open Insurance Policy, declaration has been submitted to Insurance Company as per declaration clause of Open policy and copy of or				
			6. In case of any discrepancy , consent of TBCM is required for processing the bill and amount will be deducted for invalid Insurance certific				
	PVC (If applicable) Invoice	1Original+2Co	PVC (If applicable) Invoice is submitted along with the Despatch Invoice				
			1. PVC invoice is attched along with supply Invoice				

Check List for Supply bills

Name Of the Project							
Package Description							
Invoice No. & Date							
PO No. & date							
Sr. No	Documents Required	Copies	Check Points	Page no.	Vendor Remarks	Verification by MM	Verification by Fin
					(Y/N/NA)	(Y/N/NA)	(Y/N/NA)
8	is submitted along with the Despatch Invoice	1Original+2Sc+y	2. Calculation sheet and applicable PVC indices are also enclosed				
			3. If delay in delivery, then PVC indicies are as per PO conditions.				
9	Material receipt Certificate		1. LR No and date, Invoice No and date, Vehicle No and date , Site Name an address are mentione				
			2. Date of receipt of material				
			3. Item description and quantity are same as per Invoice / Packing List				
			4. It is signed and stamped by Site executive				
			5. In case of any shortages / damages / adverse remark , clarification is needed				
10	Other Documents		To be seen as per specific requirement of PO.				

Check List for Supply bills

Name Of the Project							
Package Description							
Invoice No. & Date							
PO No. & date							
Sr. No	Documents Required	Copies	Check Points	Page no.	Vendor Remarks	Verification by MM	Verification by Fin
					(Y/N/NA)	(Y/N/NA)	(Y/N/NA)
To be filled by BHEL (MM) only							
10	Date Of Submission of Las Billing Document		Date to be mentioned		Not to be filled by vendor		
11	LD Calculation, if applicable as per PO.		Calculation Sheet of LD due to delay in delivery is attached				
12	Receipted LR (signed & stamped)/ confirmation from site regarding receipt of packages/ Boxes	1 Copy	Damages if any mentioned in the Receipted LR have been accounted for. Withhel amount if any_____				
13	Packing List - showing number of packages and gross weight & net Weight (If applicable	1 Original	If Packing list does not match with Purchase order (with ref to sl 4 above), Engg/MM acceptance as to the completeness is enclosed.				
14	PO copy	1 Copy	PO copy with original seal and signature is attached along with amendment If any				
15	Dan	1 copy	Relevant DANs are attached duly signed by TBMM representative.				
Note*	Every Field to be ticked. If some document is not applicable, same should be mentioned, All Pages to be numbered upw from the bottom Page						
	Invoice control No				Vendor Signature	MM Signature	Finance Signature
					Date:	Date:	Date:

DELETED

PROJECT:	**SUPPLY AND SUPERVISION OF ETC OF CIRCUIT BREAKERS FOR VARIOUS POWERGRID PROJECTS.**
ITEM:	**CIRCUIT BREAKERS**
ENQUIRY No.	

ANNEXURE-V

Item/ Package Name	**SUPPLY AND SUPERVISION OF ETC OF CIRCUIT BREAKERS (PACKAGE-I/ PACKAGE-II) FOR VARIOUS POWERGRID PROJECTS.**
Enquiry No.	
Project	**VARIOUS POWERGRID PROJECTS**
Percentage of Local Content	**…….%**

Format of Self-certification regarding Local Content in line with PPP-MII order, 2017 and its revision Dtd. 04.06.2020 and any subsequent modifications/ amendments, if any.

Date: ……

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 Dtd. 15.06.2017, its revision Dtd. 04.06.2020 and any subsequent modifications/ amendments**,** if any**.**

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 ***"*Supply *and supervision of ETC of Circuit Breakers (Package- I/ Package-II) for various Powergrid projects".***

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 ***"Supply and supervision of ETC of Circuit Breakers (Package- I/ Package-II) for various Powergrid projects".*** *(Enter the name of the Equipment/Item for Project)* contains ……% *(mention the Local content in %age)* Local Content.

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 supplier class categorization criteria as per said order, based on the assessment of procuring agency(s)/ BHEL/ Government Authorities for the purpose of assessing the

PROJECT:	**SUPPLY AND SUPERVISION OF ETC OF CIRCUIT BREAKERS FOR VARIOUS POWERGRID PROJECTS.**
ITEM:	**CIRCUIT BREAKERS**
ENQUIRY No.	

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.)

PROJECT:	**SUPPLY AND SUPERVISION OF ETC OF CIRCUIT BREAKERS FOR VARIOUS POWERGRID PROJECTS.**
ITEM:	**CIRCUIT BREAKERS**
ENQUIRY No.	

ANNEXURE-VI

CLAUSE REGARDING RESTRICTIONS UNDER RULE 144 (XI) OF THE GENERAL FINANCIAL RULES (GFRS), 2017 AS PER GOVERNMENT OF INDIA ORDER *OM NO. F.7/10/2021-PPD (1) DATED 23.02.2023*

I. Any bidder from a country which shares a land border with India will be eligible to bid in any procurement whether of goods, services (including consultancy services and non-consultancy services) or works (including turnkey projects) only if the bidder is registered with the Competent Authority. *Further, any bidder (including bidder from India) having specified Transfer of Technology (ToT) arrangement with an entity from a country which shares a land border with India, shall also require to be registered with the same competent authority.*

II."Bidder" (including the term 'tenderer', 'consultant' or 'service provider' in certain contexts) means any person or firm or company, including any member of a consortium or joint venture (that is an association of several persons, or firms or companies), every artificial juridical person not falling in any of the descriptions of bidders stated hereinbefore, including any agency branch or office controlled by such person, participating in a procurement process.

III."Bidder (or entity) from a country which shares a land border with India" for the purpose of this Order means: -

(a) An entity incorporated, established or registered in such a country; or

(b) A subsidiary of an entity incorporated, established or registered in such a country; or

(c) An entity substantially controlled through entities incorporated, established or registered in such a country; or

(d) An entity whose beneficial owner is situated in such a country; or

(e) An Indian (or other) agent of such an entity; or

(f) A natural person who is a citizen of such a country; or

(g) A consortium or joint venture where any member of the consortium or joint venture falls under any of the above.

IV.The beneficial owner for the purpose of (iii) above will be as under:

1. In case of a company or Limited Liability Partnership, the beneficial owner is the natural person(s), who, whether acting alone or together, or through one or more juridical person, has a controlling ownership interest or who exercises control through other means.

Explanation-

a) "Controlling ownership interest" means ownership of or entitlement to more than twenty-five per cent. of shares or capital or profits of the company;

b) "Control" shall include the right to appoint majority of the directors or to control the management or policy decisions including by virtue of their shareholding or management rights or shareholders agreements or voting agreements;

2. In case of a partnership firm, the beneficial owner is the natural person(s) who, whether acting alone or together, or through one or more juridical person, has ownership of entitlement to more than fifteen percent of capital or profits of the partnership;

3. In case of an unincorporated association or body of individuals, the beneficial owner is the natural person(s), who, whether acting alone or together, or through one or more juridical person, has ownership of or entitlement to more than fifteen percent of the property or capital or profits of such association or body of individuals;

4. Where no natural person is identified under (1) or (2) or (3) above, the beneficial owner is the relevant natural person who holds the position of senior managing official;

5. In case of a trust, the identification of beneficial owner(s) shall include identification of the author of the trust, the trustee, the beneficiaries with fifteen percent or more interest in the trust and any other natural person exercising ultimate effective control over the trust through a chain of control or ownership.

V. An Agent is a person employed to do any act for another, or to represent another in dealings with third person.

VI. The successful bidder shall not be allowed to sub-contract works to any contractor from a country which shares a land border with India unless such contractor is registered with the Competent Authority

VII. The registration shall be valid at the time of submission of bid and at the time of acceptance of bid.

VIII. If the bidder was validly registered at the time of acceptance/ placement of order, registration shall not be a relevant consideration during contract execution

The above clause is not applicable to the bidders from those countries (even if sharing a land border with India) to which the GoI has extended lines of credit or in which the GoI is engaged in development projects. List of countries to which lines of credit have been extended or in which development projects are undertaken are available on the Ministry of External affairs website (https://www.mea.gov.in/).

PROJECT:	**SUPPLY AND SUPERVISION OF ETC OF CIRCUIT BREAKERS FOR VARIOUS POWERGRID PROJECTS.**
ITEM:	**CIRCUIT BREAKERS**
ENQUIRY No.	

ANNEXURE-VII

COMPLIANCE TO GOVERNMENT OF INDIA ORDER OM No. F.7/10/2021-PPD (1) dated 23.02.2023 REGARDING RESTRICTIONS UNDER RULE 144 (XI) OF THE GENERAL FINANCIAL RULES (GFRS), 2017

PROJECT:	**SUPPLY AND SUPERVISION OF ETC OF CIRCUIT BREAKERS (PACKAGE-I/ PACKAGE-II) FOR VARIOUS POWERGRID PROJECTS.**
ITEM:	**CIRCUIT BREAKERS**
ENQUIRY No.	

Sl. No.	Description	Bidder's confirmation
1.	*We, M/s ..... have read the clause regarding restrictions on procurement from a bidder of a country which shares a land border with India; We hereby certify that we are not from such a country.* *We also have read the clause regarding restrictions on procurement from a bidder having Transfer of Technology (ToT) arrangement. We certify that we do not have any ToT arrangement requiring registration with the competent authority."*	Agreed

Note: Non-compliance of above said GoI Order and its subsequent amendment, (if any), by any bidder(s) shall lead for commercial rejection of their bids by BHEL.

Signature of the authorized representative of

Place : .....
Date : .....

Bidder's Name : .....
Designation : .....
Company Seal : .....

PROJECT:	**SUPPLY AND SUPERVISION OF ETC OF CIRCUIT BREAKERS FOR VARIOUS POWERGRID PROJECTS.**
ITEM:	**CIRCUIT BREAKERS**
ENQUIRY No.	

ANNEXURE-VIII

COMPLIANCE TO GOVERNMENT OF INDIA ORDER OM No. F.7/10/2021-PPD (1) dated 23.02.2023 REGARDING RESTRICTIONS UNDER RULE 144 (XI) OF THE GENERAL FINANCIAL RULES (GFRS), 2017

PROJECT:	**SUPPLY AND SUPERVISION OF ETC OF CIRCUIT BREAKERS (PACKAGE-I/ PACKAGE-II) FOR VARIOUS POWERGRID PROJECTS.**
ITEM:	**CIRCUIT BREAKERS**
ENQUIRY No.	

Sl. No.	Description	Bidder's confirmation
1.	*We, M/s ……. have read the clause regarding restrictions on procurement from a bidder of a country which shares a land border with India. We are from such a country which shares a land border with India & have been registered with the Competent Authority as specified in above said order. We hereby certify that we fulfil all requirements in this regard and are eligible to be considered.* *We also have read the clause regarding restrictions on procurement from a bidder having Transfer of Technology (ToT) arrangement. We certify that we have valid registration to participate in this procurement."* ***Evidence of valid registration by the Competent Authority is attached.***	

Note: Non-compliance of above said GoI Order and its subsequent amendment, (if any), by any bidder(s) shall lead for commercial rejection of their bids by BHEL.

Signature of the authorized representative of

Place : ……..
Date : ……..

Bidder's Name : ……
Designation : ……
Company Seal : ……

Annexure-IX

No.25-111612018-PG

Government of India

Ministry of Power

Shram Shakti Bhawan, Rafi Marg, New Delhi • — 110001

Tele Fax: 011-23730264

Dated 02/07/2020

ORDER

Power Supply System is a sensitive and critical infrastructure that supports not only our national defence, vital emergency services including health, disaster response, critical national infrastructure including classified data & communication services, defence installations and manufacturing establishments, logistics services but also the entire economy and the day-today life of the citizens of the country. Any danger or threat to Power Supply System can have catastrophic effects and has the potential to cripple the entire country. Therefore, the Power Sector is a strategic and critical sector.

The vulnerabilities in the Power Supply System & Network mainly arise out of the possibilities of cyber attacks through malware / Trojans etc. embedded in imported equipment. Hence, to protect the security, integrity and reliability of the strategically important and critical Power Supply System & Network in the country, the following directions are hereby issued:-

1. All equipment, components, and parts imported for use in the Power Supply System and Network shall be tested in the country to check for any kind of embedded malware/trojans/cyber threat and for adherence to Indian Standards.
2. All such testings shall be done in certified laboratories that will be designated by the Ministry of Power (MOP).
3. Any import of equipment/components/parts from "prior reference" countries as specified or by persons owned by, controlled by, or subject to the jurisdiction or the directions of these "prior reference" countries will require prior permission of the Government of India
4. Where the equipment/components/parts are imported from "prior reference" countries, with special permission, the protocol for testing in certified and designated laboratories shall be approved by the Ministry of Power (MOP).

This order shall apply to any item imported for end use or to be used as a component, or as a part in manufacturing, assembling of any equipment or to be used in power supply system or any activity directly or indirectly related to power supply system.

This issues with the approval of Hon'ble Minister of State for Power and New & Renewable Energy (Independent Charge).

(Goutam Ghosh)

Director Tel: 011-23716674 To:

1. All Ministries/Departments of Government of India (As per list)
2. Secretary (Coordination),Cabinet Secretariat
3. Vice Chairman, NITI Aayog

PROJECT:	**SUPPLY AND SUPERVISION OF ETC OF CIRCUIT BREAKERS FOR VARIOUS POWERGRID PROJECTS.**
ITEM:	**CIRCUIT BREAKERS**
ENQUIRY No.	

ANNEXURE-X

IN VIEW OF ORDER NO. 25-111612018-PG, DATED 02.07.2020 OF MINISTRY OF POWER, GOI

PROJECT:	**SUPPLY AND SUPERVISION OF ETC OF CIRCUIT BREAKERS FOR VARIOUS POWERGRID PROJECTS.**
ITEM:	**CIRCUIT BREAKERS**
ENQUIRY No.	

This is to certify that all equipment, components, and parts imported for use in the Power Supply System and Network are in strict compliance to directions issued by Ministry of Power, Govt. of India vide order No. 25-111612018-PG Dtd. 02.07.2020. The imported component(s), part or assembly item(s) does not carry any malware/ Trojan, etc.

Note: Non-compliance of MoP Order and its subsequent amendment(s), (if any), by vendor shall lead to rejection of their offer or cancellation of contract, which is awarded by BHEL.

Signature of the authorized representative of

Place : ……..
Date : ……..

Bidder's Name : ……
Designation : ……
Company Seal : ……

Annexure-XI

INTEGRITY PACT

Between

Bharat Heavy Electricals Ltd. (BHEL), a company registered under the Companies Act 1956 and having its registered office at "BHEL House", Siri Fort, New Delhi - 110049 (India) hereinafter referred to as "The Principal", which expression unless repugnant to the context or meaning hereof shall include its successors or assigns of the ONE PART

and

_____, (description of the party along with address), hereinafter referred to as "The Bidder/ Contractor" which expression unless repugnant to the context or meaning hereof shall include its successors or assigns of the OTHER PART

Preamble

The Principal intends to award, under laid-down organizational procedures, contract/s for _____

_____
_____ (hereinafter referred to as "Contract"). The Principal values full compliance with all relevant laws of the land, rules and regulations, and the principles of economic use of resources, and of fairness and transparency in its relations with its Bidder(s)/ Contractor(s).

In order to achieve these goals, the Principal will appoint panel of Independent External Monitor(s) (IEMs), who will monitor the tender process and the execution of the contract for compliance with the principles mentioned above.

Section 1- Commitments of the Principal

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

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

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

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

1.2 If the Principal obtains information on the conduct of any of its employees which is a penal offence under the Indian Penal Code 1860 and Prevention of Corruption Act 1988 or any other statutory penal enactment, or if there be a substantive suspicion in this regard, the Principal will inform its Vigilance Office and in addition can initiate disciplinary actions.

Section 2 - Commitments of the Bidder(s)/ Contractor(s)

2.1 The Bidder(s)/ Contractor(s) commit himself to take all measures necessary to prevent corruption. The Bidder(s)/ Contractor(s) commits himself to observe the following principles during participation in the tender process and during the contract execution.

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

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

2.1.3 The Bidder(s)/ Contractor(s) will not commit any penal offence under the relevant Indian Penal Code (IPC) and Prevention of Corruption Act; further the Bidder(s)/ Contractor(s) will not use improperly, for purposes of competition or personal gain, or pass on to others, any information or document provided by the Principal as part of the business relationship, regarding plans, technical proposals and business details, including information contained or transmitted electronically.

2.1.4 Foreign Bidder(s)/ Contractor(s) shall disclose the name and address of agents and representatives in India and Indian Bidder(s)/ Contractor(s) to disclose their foreign principals or associates. The Bidder(s)/ Contractor(s) will, when presenting his bid, disclose any and all payments he has made, and is committed to or intends to make to agents, brokers or any other intermediaries in connection with the award of the contract.

2.2 The Bidder(s)/ Contractor(s) will not instigate third persons to commit offences outlined above or be an accessory to such offences.

2.3 The Bidder(s)/ Contractor(s) shall not approach the Courts while representing the matters to IEMs and shall await their decision in the matter.

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

If the Bidder(s)/ Contractor(s), before award or during execution has committed a transgression through a violation of Section 2 above, or acts in any other manner such as to put his reliability or credibility in question, the Principal is entitled to disqualify the Bidder(s)/ Contractor(s) from the tender process , terminate the contract, if already awarded, exclude from future business dealings and/ or take action as per the separate "Guidelines on Banning of Business dealings with Suppliers/ Contractors", framed by the Principal.

Section 4 - **Compensation for Damages**

4.1 If the Principal has disqualified the Bidder (s) from the tender process before award / order acceptance according to Section 3, the Principal is entitled to demand and recover the damages equivalent to Earnest Money Deposit/ Bid Security.

4.2 If the Principal is entitled to terminate the Contract according to Section 3, or terminates the Contract in application of Section 3 above , the Bidder(s)/ Cotractor (s) transgression through a violation of Section 2 above shall be construed breach of contract and the Principal shall be-entitled to demand and recover from the Contractor an amount equal to 5% of the contract value or the amount equivalent to Security Deposit/ Performance Bank Guarantee , whichever is higher, as damages, in addition to and without prejudice to its right to demand and recover compensation for any other loss or damages specified elsewhere in the contract.

Section 5 - Previous Transgression

5.1 The Bidder declares that no previous transgressions occurred in the last 3 (three) years with any other company in any country conforming to the anti-corruption approach or with any other Public Sector Enterprise in India that could justify his exclusion from the tender process.

5.2 If the Bidder makes incorrect statement on this subject, he can be disqualified from the tender process or the contract, if already awarded, can be terminated for such reason or action can be taken as per the separate "Guidelines on Banning of Business dealings with Suppliers/ Contractors", framed by the Principal.

Section 6 - Equal treatment of all Bidder (s)/ Contractor (s) / Sub-contractor (s)

6.1 The Principal will enter into Integrity Pacts with identical conditions as this Integrity Pact with all Bidders and Contractors.

6.2 In case of Sub-contracting, the Principal Contractor shall take the responsibility of the adoption of Integrity Pact by the Sub-contractor(s) and ensure that all Sub-contractors also sign the Integrity Pact.

6.3 The Principal will disqualify from the tender process all Bidders who do not sign this Integrity Pact or violate its provisions.

Section 7 - Criminal Charges against violating Bidders/ Contractors /Subcontractors

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

Section 8 -Independent External Monitor(s)

8.1 The Principal appoints competent and credible panel of Independent External Monitor (s) (IEMs) for this Integrity Pact. The task of the IEMs is to review independently and objectively, whether and to what extent the parties comply with the obligations under this Integrity Pact.

8.2 The IEMs are not subject to instructions by the representatives of the parties and performs his functions neutrally and independently. He reports to the CMD, BHEL.

8.3 The IEMs shall be provided access to all documents/ records pertaining to the Contract, for which a complaint or issue is raised before them as and when warranted. However, the documents/records/information having National Security implications and those documents which have been classified as Secret/Top Secret are not to be disclosed.

8.4 The Principal will provide to the IEMs sufficient information about all meetings among the parties related to the Contract provided such meetings could have an impact on the contractual relations between the Principal and the Contractor. The parties offer to the IEMs the option to participate in such meetings.

8.5 The advisory role of IEMs is envisaged as that of a friend, philosopher and guide. The advice of IEMs would not be legally binding and it is restricted to resolving issues raised by a Bidder regarding any aspect of the tender which allegedly restricts competition or bias towards some Bidders. At the same time, it must be understood that IEMs are not consultants to the Management. Their role is independent in nature and the advice once tendered would not be subject to review at the request of the organization.

8.6 For ensuring the desired transparency and objectivity in dealing with the complaints arising out of any tendering process or during execution of Contract, the matter should be examined by the full panel of IEMs jointly, who would look into the records, conduct an investigation, and submit their joint recommendations to the Management.

8.7 The IEMs would examine all complaints received by them and give their recommendations/ views to the CMD, BHEL at the earliest. They may also send their report directly to the CVO, in case of suspicion of serious irregularities requiring legal/ administrative action. Only in case of very serious issue having a specific, verifiable Vigilance angle, the matter should be reported directly to the Commission. IEMs will tender their advice on the complaints within 30 days.

8.8 The CMD, BHEL shall decide the compensation to be paid to the IEMs and its terms and conditions.

8.9 IEMs should examine the process integrity, they are not expected to concern themselves with fixing of responsibility of officers. Complaints alleging mala fide on the part of any officer of the Prinicpal should be looked into by the CVO of the Principal.

8.10 If the IEMs have reported to the CMD, BHEL, a substantiated suspicion of an offence under relevant Indian Penal Code / Prevention of Corruption Act, and the CMD, BHEL has not, within reasonable time, taken visible action to proceed against such offence or reported it to the Vigilance Office, the IEMs may also transmit this information directly to the Central Vigilance Commissioner, Government of India.

8.11 After award of work, the IEMs shall look into any issue relating to execution of Contract, if specifically raised before them. As an illustrative example, if a Contractor who has been awarded the Contract, during the execution of Contract, raises issue of delayed payment etc. before the IEMs, the same shall be examined by the panel of IEMs. Issues like warranty/ guarantee etc. shall be outside the purview of IEMs.

8.12 However, the IEMs may suggest systemic improvements to the management of the Principal, if considered necessary, to bring about transparency, equity and fairness in the system of procurement.

8.13 The word `Monitor' would include both singular and plural.

Section 9 - Pact Duration

9.1 This Integrity Pact shall be operative from the date this Integrity Pact is signed by both the parties till the final completion of contract for successful Bidder, and for all other Bidders 6 months after the Contract has been awarded. Any violation of the same would entail disqualification of the bidders and exclusion from future business dealings.

9.2 If any claim is made/ lodged during currency of this Integrity Pact, the same shall be binding and continue to be valid despite the lapse of this Pact as specified above, unless it is discharged/ determined by the CMD, BHEL.

Section 10 - Other Provisions

10.1 This Integrity Pact is subject to Indian Laws and exclusive jurisdiction shall be of the competent Courts as indicated in the Tender or Contract, as the case may be.

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

10.3 If the Bidder(s)/ Contractor(s) is a partnership or a consortium or a joint venture, this Integrity Pact shall be signed by all partners of the partnership or joint venture or all consortium members.

10.4 Should one or several provisions of this Integrity Pact turn out to be invalid, the remainder of this Integrity Pact remains valid. In this case, the parties will strive to come to an agreement to their original intentions.

10.5 Only those bidders / contractors who have entered into this Integrity Pact with the Principal would be competent to participate in the bidding. In other words, entering into this Integrity Pact would be a preliminary qualification.

10.6 In the event of any dispute between the Principal and Bidder(s)/ Contractor(s) relating to the Contract, in case, both the parties are agreeable, they may try to settle dispute through Mediation before the panel of IEMs in a time bound manner. In case, the dispute remains unresolved even after mediation by the panel of IEMs, either party may take further action as the terms & conditions of the Contract. The fees/expenses on dispute resolution through mediation shall be shared by both the parties. Further, the mediation proceedings shall be confidential in nature and the parties shall keep confidential all matters relating to the mediation proceedings including any settlement agreement arrived at between the parties as outcome of mediation. Any views expressed, suggestions, admissions or proposals etc. made by either party in the course of mediation shall not be relied upon or introduced as evidence in any further arbitral or judicial proceedings, whether or not such proceedings relate to the dispute that is the subject of mediation proceedings. Neither of the parties shall present IEMs as witness in any Alternative Dispute Resolution or judicial proceedings in respect of the dispute that was subject of mediation.

03/02/2025

For & On behalf of the Principal
(Office Seal)

दीप शेखर चौधरी/Deep Shekhar Chowdhary
उप प्रबंधक (चालान ग्रहण)/Dy. Manager (TBMM)
पारेषण व्यापार समूह/Transmission Business Group
भारत हेवी इलेक्ट्रिकल्स लिमिटेड/Bharat Heavy Electricals Ltd.
5वीं मंजिल, भेल सदन, प्लॉट नं 25, सेक्टर-16ए, नोएडा-201301 (उ.प्र.)
5th Floor, BHEL Sadan, Plot No. 25, Sector 16A, Noida-201301 (U.P.)

Place _____

Date _____

Witness: N.Verma 03/02/25
(Name & Address) Nandlal Verma
Noida

For & On behalf of the Bidder/ Contractor
(Office Seal)

Witness: _____
(Name & Address) _____
_____

Assessment report from Contractor for proposed sub-vendor along with following enclosures (to the extent available):

1. Registration / License of the works
2. Organization chart with name and qualification of key persons
3. List of Plant and Machinery.
4. List of testing equipment with their calibration status.
5. List of Raw material, bought out items with sourcing details
6. List of out-sourced services with sourcing details.
7. List of supply in last three years.
8. Third party approval, if any (viz. ISO, BIS),
9. Pollution clearance wherever applicable
10. Energy Conservation & Efficiency report
    (Applicable to industries having contract load more than 100 KVA)
11. Formats for RM, in process and acceptance testing
12. Type test approvals conducted in last 5 years, if applicable
13. Performance Certificates from customers
14. Photographs of factory, plant and machinery & testing facilities

MANUFACTURING QUALITY PLAN

	Manufacturers Details (Name, Works Address etc.)	Customer POWERGRID	Vendor's Code:	Item:	Q.P. No. Rev. No. Date:	Valid From: Valid Upto:

Sr. No.	Components / Operations & Description of Test	Type of check	Quantum of Check / Sampling with basis	Reference document for Testing	Acceptance Norms	Format of Record	Applicable Codes						Remarks
							1	2	3	4	5	6	
A. Section: RAW MATERIAL INSPECTION													
B. Section : IN PROCESS INSPECTION													
C. Section: FINAL TESTING													
D. Section: PACKING & DISPATCH													

MANUFACTURING QUALITY PLAN

		Customer POWERGRID	Vendor's Code:	Item:	Q.P. No. Rev. No. Date:	Valid From: Valid Upto:

Code 1	Indicates place **where testing is planned** to be performed i.e. Inspection location
A	At Equipment Manufacturer's works
B	At Component Manufacturer's works
C	At Authorised Distributor's place
D	At Independent Lab
E	At Turn Key Contractor's location
F	Not specified

Code 2	Indicates **who has to perform the tests** i.e. Testing Agency
J	The Equipment Manufacturer
K	The Component Manufacturer
L	The Third Party
M	The Turnkey Contractor

Code 3	Indicates **who shall witness** the tests i.e. Witnessing Agency
P	Component Manufacturer itself
Q	Component Manufacturer and Equipment Manufacturer
R	Component Manufacturer, Equipment Manufacturer and Contractor
S	Equipment Manufacturer itself
T	Equipment Manufacturer and Contractor
U	Equipment Manufacturer, Contractor and POWERGRID
V	Third Party itself

Code 4	Review of Test Reports/Certificates
W	By Equipment manufacturer during raw material/bought out component Inspection.
X	By Contractor during product/process inspection
Y	By POWERGRID during product/process inspection
Z	By Contractor and/or POWERGRID during product/process inspection

Code 5	Whether specific approval of sub-vendor / Component make is envisaged?
E	Envisaged
	Not Envisaged

Code 6	Whether test records required to be submitted after final inspection for issuance of CIP/MICC
Y	Yes
N	No

BANK GUARANTEE FOR PERFORMANCE SECURITY **Annexure-XIII**

Bank Guarantee No:

Date:

To

NAME

& ADDRESSES OF THE BENEFICIARY

Dear Sirs,

In consideration of the Bharat Heavy Electricals Limited [1] (hereinafter referred to as the 'Employer' which expression shall unless repugnant to the context or meaning thereof, include its successors and permitted assigns) incorporated under the Companies Act, 1956 and having its registered office at BHEL House Siri Fort New Delhi-110049 through its Unit at BHEL, TBG, Noida having awarded to (Name of the Vendor / Contractor / Supplier) having its registered office at_____[2] hereinafter referred to as the 'Contractor/Supplier', which expression shall unless repugnant to the context or meaning thereof, include its successors and permitted assigns), a contract Ref No PO No.é é é é é é é é dated é é é é é é é é é é é é é .[3] valued at Rsé é é é [4] (Rupees ----------)/FCé é é é é é (in wordsé é ..) for é é é é é é é é é é [5] (hereinafter called the 'Contract') and the Contractor having agreed to provide a Contract Performance Guarantee, equivalent to é é % (é . Percent) of the said value of the Contract to the Employer for the faithful performance of the Contract,

we, é é é é é é é , (hereinafter referred to as the Bank), having registered/Head office at é é é é é . and inter alia a branch at é é é é being the Guarantor under this Guarantee, hereby, irrevocably and unconditionally undertake to forthwith and immediately pay to the Employer a maximum amount Rs ---------- (Rupees ----------) without any demur, immediately on a demand from the Employer, .
Any such demand made on the Bank shall be conclusive as regards the amount due and payable by the Bank under this guarantee. However, our liability under this guarantee shall be restricted to an amount not exceeding Rs. _____ _____.

We undertake to pay to the Employer any money so demanded notwithstanding any dispute or disputes raised by the Contractor/ Supplier in any suit or proceeding pending before any Court or Tribunal relating thereto our liability under this present being absolute and unequivocal.

The payment so made by us under this Guarantee shall be a valid discharge of our liability for payment thereunder and the contractors/supplier shall have no claim against us for making such payment.

We the é é é é é é é bank further agree that the guarantee herein contained shall remain in full force and effect during the period that would be taken for the performance of the said Contract and that it shall continue to be enforceable till all the dues of the Employer under or by virtue of the said Contract have been fully paid and its claims satisfied or discharged.

We é é é é é .. BANK further agree with the Employer that the Employer shall have the fullest liberty without our consent and without affecting in any manner our obligations hereunder to vary any of the terms and conditions of the said Contract or to extend time of performance by the said Contractor/Supplier from time to time or to postpone for any time or from time to time any of the powers exercisable by the Employer against the said Contractor/Supplier and to forbear or enforce any of the terms and conditions relating to the said Agreement and we shall not be relieved from our liability by reason of any such variation, or extension being granted to the said Contractor/Supplier or for any forbearance, act or omission on the part of the Employer or any indulgence by the Employer to the said Contractor/Supplier or by any such matter or thing whatsoever which under the law relating to sureties would but for this provision have effect of so relieving us.

The Bank also agrees that the Employer at its option shall be entitled to enforce this Guarantee against the Bank as a principal debtor, in the first instance without proceeding against the Contractor and notwithstanding any security or other guarantee that the Employer may have in relation to the Contractor's liabilities.

This Guarantee shall remain in force upto and includingé é é é é é é é é .. [6] and shall be extended from time to time for such period as may be desired by Employer.
This Guarantee shall not be determined or affected by liquidation or winding up, dissolution or change of constitution or insolvency of the Contractor/Supplier but shall in all respects and for all purposes be binding and operative until payment of all money payable to the Employer in terms thereof.

Unless a demand or claim under this guarantee is made on us in writing on or before the é é é é é é é é é é .[7] we shall be discharged from all liabilities under this guarantee thereafter.

We é é é é é BANK lastly undertake not to revoke this guarantee during its currency except with the previous consent of the Employer in writing.
Notwithstanding anything to the contrary contained hereinabove:

a) The liability of the Bank under this Guarantee shall not exceedé é é é é é é é é [8]
b) This Guarantee shall be valid up to é é é é é é [9]
c) Unless the Bank is served a written claim or demand on or before _____[10] all rights under this guarantee shall be forfeited and the Bank shall be relieved and discharged from all liabilities under this guarantee irrespective of whether or not the original bank guarantee is returned to the Bank.

We, _____ Bank, have power to issue this Guarantee under law and the undersigned as a duly authorized person has full powers to sign this Guarantee on behalf of the Bank.

For and on behalf of
(Name of the Bank)

Datedé é é é é é .
Place of Issueé é é é é é .

Instruction for BG

[1] NAME AND ADDRESS OF EMPLOYER I.e Bharat Heavy Electricals Limited

[2] NAME AND ADDRESS OF THE VENDOR /CONTRACTOR / SUPPLIER.

[3] DETAILS ABOUT THE NOTICE OF AWARD/CONTRACT REFERENCE

[4] PROJECT/SUPPLY DETAILS

[5] BG AMOUNT IN FIGURES AND WORDS

[6] VALIDITY DATE

[7] DATE OF EXPIRY OF CLAIM PERIOD

[8] BG AMOUNT IN FIGURES AND WORDS.

[9] VALIDITY DATE

[10] DATE OF EXPIRY OF CLAIM PERIOD

Note:

1. **Units are advised that expiry of claim period may be kept 2/3 months after validity date.**

2. **In Case of Bank Guarantees submitted by Foreign Vendors-**

   a. **From Nationalized/Public Sector / Private Sector/ Foreign Banks (BG issued by Branches in India)** can be accepted subject to the condition that the Bank Guarantee should be enforceable in the town/city or at nearest branch where the Unit is located i.e. Demand can be presented at the Branch located in the town/city or at nearest branch where the Unit is located.

   b. **From Foreign Banks (wherein Foreign Vendors intend to provide BG from local branch of the Vendor country's Bank)**

   b.1 In such cases, in the Tender Enquiry/ Contract itself, it may be clearly specified that Bank Guarantee issued by **any of the Consortium Banks only** will be accepted by BHEL. As such, Foreign Vendor needs to make necessary arrangements for issuance of Counter- Guarantee by Foreign Bank in favour of the Indian Bank (BHEL's Consortium Bank). It is advisable that all charges for issuance of Bank Guarantee/ counter- Guarantee should be borne by the Foreign Vendor. The tender stipulation should clearly specify these requirements.

   b.2 **In case, Foreign Vendors intend to provide BG from** Overseas Branch of our Consortium Bank (e.g. if a BG is to be issued by SBI Frankfurt), the same is acceptable. However, the procedure at **sl.no. b.1** will required to be followed.

   b.3 The BG issued may preferably be subject to Uniform Rules for Demand Guarantees (URDG) 758 (as amended from time to time). In case, of Foreign Vendors, the BG Format provided to them should clearly specify the same.

   b.4 The BG should clearly specify that the demand or other document can be presented in electronic form.

Annexure for List of Banks (32 Nos.)

Sr. No.	Name of Bank
1	Allahabad Bank
2	Andhra Bank
3	Bank of Baroda
4	Canara Bank
5	Corporation Bank
6	Central Bank
7	Indian Bank
8	Indian Overseas Bank
9	Oriental Bank of Commerce
10	Punjab National Bank
11	Punjab & Sindh Bank
12	State Bank of India
13	State Bank of Hyderabad
14	Syndicate Bank
15	State Bank of Travancore
16	UCO Bank
17	Union Bank of India
18	United Bank of India
19	Vijaya Bank
20	IDBI
21	CITI Bank N. A.
22	Deutsche Bank AG
23	The Hongkong and Shanghai Banking Corporation Limited
24	Standard Chartered Bank
25	J P Morgan
26	Axis Bank
27	The Federal Bank Limited
28	HDFC
29	Kotak Mahindra Bank
30	ICICI
31	Indusind Bank
32	Yes Bank

PROJECT:	**SUPPLY AND SUPERVISION OF ETC OF CIRCUIT BREAKERS (PACKAGE-I/ PACKAGE-II) FOR VARIOUS POWERGRID PROJECTS.**
ITEM:	**CIRCUIT BREAKERS**
ENQUIRY No.	

ANNEXURE-XV

CONTACT DETAILS OF BIDDER

Work Address	
Correspondence Address	
PAN NO.	
GST No.	
GeM Seller Id.	
MSME Status (MICRO/SMALL/MEDIUM)	
Details of contact person for clarification regarding bid:	
Contact Person Name	
Designation	
email ID	
Mobile No.	
Landline No.	

Signature of the authorized representative of

Place : ……..
Date : ……..

Bidder's Name : ……
Designation : ……
Company Seal : ……

PROJECT:	**SUPPLY AND SUPERVISION OF ETC OF CIRCUIT BREAKERS (PACKAGE-I/ PACKAGE-II) FOR VARIOUS POWERGRID PROJECTS.**
ITEM:	**CIRCUIT BREAKERS**
ENQUIRY No.	

ANNEXURE-XVI

SCHEDULE OF TECHNICAL DEVIATION

The following are the deviations / variations / exceptions from the Technical Specifications:

Sl. No.	Clause No. of Technical Specifications	Statement of Deviation
	Nil Deviation	**Nil 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 Technical Specifications.

If there is **Nil Deviation**, even then the format to be filled as **Nil Deviation**.

Note:

1. Continuation sheets of like size and format may be used as per the Bidder's Requirement and shall be annexed to this schedule.
2. Deviation mentioned in this schedule shall only be considered.

Signature of the authorized representative of

Place : ……..
Date : ……..

Bidder's Name : ……
Designation : ……
Company Seal : ……

PROJECT:	**SUPPLY AND SUPERVISION OF ETC OF CIRCUIT BREAKERS (PACKAGE-I/ PACKAGE-II) FOR VARIOUS POWERGRID PROJECTS.**
ITEM:	**CIRCUIT BREAKERS**
ENQUIRY No.	

ANNEXURE-XVII

SCHEDULE OF COMMERCIAL DEVIATION

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

Sl. No.	Clause No. of Terms and Conditions	Statement of Deviation
	Nil Deviation	**Nil 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 Terms and Conditions.

If there is **Nil Deviation**, even then the format to be filled as **Nil Deviation**.

Note:

1. Continuation sheets of like size and format may be used as per the Bidder's Requirement and shall be annexed to this schedule.
2. Deviation mentioned in this schedule shall only be considered.

Signature of the authorized representative of

Place : ……..
Date : ……..

Bidder's Name : ……
Designation : ……
Company Seal : ……

PROJECT:	**SUPPLY AND SUPERVISION OF ETC OF CIRCUIT BREAKERS (PACKAGE-I/ PACKAGE-II) FOR VARIOUS POWERGRID PROJECTS.**
ITEM:	**CIRCUIT BREAKERS**
ENQUIRY No.	

No. A-1/2021-FSC-Part(5)
Government of India
Ministry of Power

Shram Shakti Bhawan, New Delhi
Dated: 16th November, 2021

ORDER

Subject: Public Procurement (Preference to Make in India) to provide for Purchase Preference (linked with local content) in respect of Power Sector.

Reference: Department for Promotion of Industry and Internal Trade (DPIIT) Notification No. P-45021/2/2017-PP (BE-II) dated 16.09.2020.

The Government of India, Department for Promotion of Industry and Internal Trade (DPIIT) issued Public Procurement (Preference to Make in India), Order 2017, for encouraging 'Make in India' and promoting manufacturing and production of goods and services in India with a view to enhancing income and employment. Subsequently, DPIIT vide order No. P-45021/2/2017-PP (BE-II) dated 4th June, 2020 and further vide order dated 16th September, 2020 have issued the revised Public Procurement (Preference to Make in India) Order 2017.

2. In light of the Public Procurement (Preference to Make in India) Order 2017, this Ministry had notified purchase preference (linked with local content) for Hydro and Transmission sectors vide Order No. 11/05/2018-Coord dated 20.12.2018, for Thermal sector vide Order dated 28.12.2018 and for Distribution sector vide Order dated 17.03.2020. Further, a combined order dated 04.04.2020 was also issued in supersession of all previous orders to indicate equipment/material/components for which there was sufficient local capacity and competition and also to indicate conditions for including suitably in the tenders to be issued by the procurers. In furtherance of Para 19 of the DPIIT Notification No. P-45021/2/2017-PP(BE-II) dated 04.06.2020, Ministry of Power (MoP) issued a revised comprehensive Order dated 28.07.2020 (Annexure-I amended by order dated 17.09.2020).

3. DPIIT Notification No. P-45021/2/2017-PP(BE-II) dated 16.09.2020 has further revised its order dated 04.06.2020. Therefore, in supersession of all the aforementioned orders including order No.10/1/2019-St.Th. (Part-II) dated 20.03.2020 issued by this Ministry, the following has been decided:

i. For the purpose of this order, the definitions of various terms used in the order, and provisions relating to (i) Eligibility of 'Class-I local supplier'/'Class-II local supplier'/'Non-local suppliers' for different types of procurement, (ii) purchase preference (iii) exemption to small purchases and (iv) margin of purchase preference shall be the same as in DPIIT order dated 16.09.2020, referred to above and extracts of the same is given at **Appendix**.

ii. In procurement of all goods and services or works in respect of which there is sufficient local capacity and local competition as in **Annexure-I,** only "Class–I local supplier" shall be eligible to bid irrespective of purchase value. "Class-I local supplier" is a supplier or service provider whose goods, services or works offered for procurement meets the Minimum Local Content (MLC) as prescribed in Annexure-I of this order. "Class-II local supplier" means a

supplier, as defined by DPIIT in its Order No. P-45021/2/2017-PP (BE-II) dated 16-09-2020.

iii. In the procurement of all goods and services or works other than those listed in Annexure-I, only "Class-I local supplier" and "Class-II local supplier" as defined in the order of this Ministry herewith shall be eligible to bid in procurement undertaken by procuring entities, except when Global Tender Enquiry has been issued. In Global tender enquiries, "Non-local suppliers" shall also be eligible to bid along with "Class-I local suppliers" and "Class-II local suppliers". In procurement of all goods, services or works not covered by sub-para 3(ii) above, and with estimated value of purchases less than Rs. 200 crores, in accordance with Rule 161(iv) of GFR, 2017, Global Tender Enquiry(GTE) shall not be issued except with the approval of the competent authority as designated by Department of Expenditure.

iv. For the purpose of this order, 'Works' means all works as per Rule 130 of GFR- 2017, and will also include *'turnkey works'*, Engineering, Procurement and Construction (EPC) contracts and service contracts including System Integrator (SI) contracts.

4. The list of items, in respect of which, local capacity with sufficient competition exists as per **Annexure-I**, will be reviewed at regular intervals with a view to increase number of items in this list and also to increase the MLC for each item, wherever it is less than 100%.

5. Purchase preference shall be given to local suppliers in accordance with **para 3A** of DPIIT Order dated 16.09.2020, and extracts of the same are given at **Appendix**.

6. Further, it has been decided to constitute a committee for independent verification of self-declarations and auditor's / accountant's certificates on random basis and in the case of complaints. The composition of the committee is given below:

Member (Planning), Central Electricity Authority (CEA)	Chairperson
Chief Engineer (PSETD), CEA	Member
Chief Engineer (HETD), CEA	Member
Chief Engineer (TETD), CEA	Member
Chief Engineer (DP&R), CEA	Member
As may be co-opted by CEA	External Expert
Chief Engineer (R&D), CEA	Convener

7. Further, it has also been decided to constitute a committee to examine the grievances in consultation with stakeholders and recommend appropriate actions to the Competent Authority in MoP. The composition of the Committee is given below:

Chairperson, CEA	Chairperson
Member (Hydro), CEA	Member

Member (Power System), CEA	Member
Member (Thermal), CEA	Convener

8. The complaint fee of Rs. 2 Lakhs or 1% of the value of the local item being procured (subject to maximum of Rs. 5 Lakhs), whichever is higher, shall be paid in the form of Demand Draft, drawn in favour of **PAO, CEA, New Delhi.** In case the complaint is found to be incorrect, the complaint fee shall be forfeited. In case, the complaint is upheld and found to be substantially correct, the deposited fee of the complainant would be refunded without any interest.

9. All other conditions, not stipulated in this order, shall be as laid down in the DPIIT's order No. P-45021/2/2017-PP (BE-II) dated 16.09.2020.

10. This order shall be applicable in respect of the procurement made by all attached or subordinate offices or autonomous bodies under the Government of India including Government Companies as defined in the Companies Act, and /or the States and Local Bodies making procurement under all Central Schemes/ Central Sector Schemes where the Scheme is fully or partially funded by the Government of India. The aforesaid orders shall also be applicable in respect of projects wherein funding of goods, services or works is by Power Finance Corporation (PFC) /Rural Electrification Corporation (REC) and any Financial Institution in which Government of India/ State Government share exists. This order shall be applicable to Tariff Based Competitive Bidding (TBCB) projects also. Procuring entities as defined in the DPIIT's Order dated 16.09.2020 are advised to revise their tender documents to fully comply with the said DPIIT's Order and the subsequent Orders that would be issued in this regard by DPIIT/ this Ministry from time to time.

11. All tenders for procurement by Central Government Agencies or the States and Local Bodies, as the case may be, have to be certified for compliance of the Public Procurement (Preference to Make in India) 'PPP-MII' Order by the concerned procurement officer of the Government Organization before uploading the same on the portal.

12. Exemption from meeting the stipulated local content is allowed as per clause 13 and 13A of PPP-MII Order dated 16.09.2020, if the manufacturer declares that the item is manufactured in India under a License from a foreign Manufacturer who holds Intellectual Property Rights (IPRs) and there is Transfer of Technology (ToT) with phasing to increase Minimum Local Content. For such items, if any CPSE under the administration of Ministry of Power requests exemption for any item, it shall be considered by Ministry of Power, on case to case basis.

13. In order to further encourage Make in India initiatives and promote manufacturing and production of goods and services in India, general guidelines as enclosed at **Annexure-II** may be adopted in an appropriate manner according to the circumstances by the procuring entities in their tendering process.

14. The procurers may specify the higher values of MLC than those specified in this Order in respect of goods, services or works covered in their tenders and award the weightage to the product of higher MLC for which they have to specify the criteria beforehand in their tender. The values given in Annexure-I are the minimum prescribed values for becoming a class-I local supplier for the products indicated therein.

15. This issues with the approval of Hon'ble Minister for Power and New & Renewable Energy.

(S. Majumdar)
Under Secretary to the Government of India
Tele No. 011- 23356938

To:

1. Secretary to Government of India (All Ministries/ Departments of Government of India) (As per list)
2. Secretary (Coordination), Cabinet Secretariat
3. CEO, NITI Aayog
4. Chief Secretaries of all States/ UTs
5. Comptroller and Auditor General of India
6. Secretary, DPIIT, Chairman of Standing Committee for implementation of Public Procurement Order, 2017
7. Director General, Bureau of Indian Standards (BIS)
8. Joint Secretary, DPIIT, Member-Convener of Standing Committee for implementation of Public Procurement Order, 2017
9. Chairperson, CEA
10. CMDs of CPSEs, CMD NLC, Chairman of DVC/ BBMB/ EESL, DGs of BEE/ CPRI/ NPTI
11. All Additional Secretaries/ JSs/ EA/ CE, Ministry of Power

Copy to:

Director (Technical), NIC with a request to publish the Order on the website of Ministry of Power

APPENDIX

Extracts of important provisions contained in DPIIT Order No. P-45021/2/2017-PP (BE-II) dated 16-09-2020

1. **Definitions** *(Para 2 of DPIIT order)*:

'Local content' means the amount of value added in India which shall, unless otherwise prescribed by the Nodal Ministry, be the total value of the item procured (excluding net domestic indirect taxes) minus the value of imported content in the item (including all customs duties) as a proportion of the total value, in percent.

'Class-I local supplier' means a supplier or service provider, whose goods, services or works offered for procurement, meets the minimum local content as prescribed for 'Class-I local supplier' under this Order.

'Class-II local supplier' means a supplier or service provider, whose goods, services or works offered for procurement, meets the minimum local content as prescribed for 'Class-II local supplier' but less than that prescribed for "Class-I Local supplier" under this Order.

'Non-Local supplier' means a supplier or service provider, whose goods, services or works offered for procurement, has local content less than that prescribed for 'Class-II local supplier' under this Order.

'L1' means the lowest tender or lowest bid or the lowest quotation received in a tender, bidding process or other procurement solicitation as adjudged in the evaluation process as per the tender or other procurement solicitation.

'Margin of purchase preference' means the maximum extent to which the price quoted by a 'Class-I local supplier' may be above the L1 for the purpose of purchase preference.

'Nodal Ministry' means the Ministry or Department identified pursuant to this order in respect of a particular item of goods or services or works.

'Procuring entity' means a Ministry or department or attached or subordinate office of, or autonomous body controlled by, the Government of India and includes Government companies as defined in the Companies Act.

'Works' means all works as per Rule 130 of GFR- 2017, and will also include *'turnkey works'*.

2. **Eligibility of 'Class-I local supplier'/ 'Class-II local supplier'/ 'Non-local suppliers' for different types of procurement** *(Para 3 of DPIIT order)*

(a) In procurement of all goods, services or works in respect of which the Nodal Ministry / Department has communicated that there is sufficient local capacity and local competition, only 'Class-I local supplier', as defined under the Order, shall be eligible to bid irrespective of purchase value.

(b) Only 'Class-I local supplier' and 'Class-II local supplier', as defined under the Order, shall be eligible to bid in procurements undertaken by procuring entities, except when Global tender enquiry has been issued. In global tender enquiries, 'Non-local suppliers' shall also be eligible to bid along with 'Class-I local suppliers' and 'Class-II local suppliers'. In procurement of all goods, services or works, not covered by 3(a)above, and with estimated value of purchases less than Rs 200 crores, in accordance with Rule 161(iv) of GFR, 2017 Global tender enquiry shall not

be issued except with the approval of competent authority as designated by Department of Expenditure.

(c) For the purpose of this Order, works includes Engineering, Procurement and Construction (EPC) contracts and services include System Integrator (SI) contracts.

3. **Purchase Preference** *(Para 3A of DPIIT order)*

(a) Subject to the provisions of this Order and to any specific instructions issued by the Nodal Ministry or in pursuance of this Order, purchase preference shall be given to 'Class-I local supplier' in procurements undertaken by procuring entities in the manner specified here under.

(b) In the procurements of goods or works, which are covered by para 3(b) of DPIIT Order No. P-45021/2/2017-PP(BE-II) dated 16-09-2021 and which are divisible in nature, the " Class-I local supplier' shall get purchase preference over 'Class-II local supplier' as well as 'Non-local supplier', as per following procedure:

i. Among all qualified bids, the lowest bid will be termed as L1 If L1 is 'Class-I local supplier', the contract for full quantity will be awarded to L1.
ii. If L1 bid is not a 'Class-I local supplier', 50% of the order quantity shall be awarded to L1. Thereafter, the lowest bidder among the 'Class-I local supplier' will be invited to match the L1 price for the remaining 50% quantity subject to the Class-I local supplier's quoted price falling within the margin of purchase preference, and contract for that quantity shall be awarded to such 'Class-I local supplier' subject to matching the L1 price. In case such lowest eligible 'Class-I local supplier' fails to match the L1 price or accepts less than the offered quantity, the next higher 'Class-I local supplier' within the margin of purchase preference shall be invited to match the L1 price for remaining quantity and so on, and contract shall be awarded accordingly. In case some quantity is still left uncovered on Class-I local suppliers, then such balance quantity may also be ordered on the L1 bidder.

(c) In the procurements of goods or works, which are covered by para 3(b) of DPIIT Order No. P-45021/2/2017-PP(BE-II) dated 16-09-2021 and which are not divisible in nature, and in procurement of services where the bid is evaluated on price alone, the 'Class-I local supplier' shall get purchase preference over 'Class-II local supplier' as well as 'Non-local supplier', as per following procedure:

iii. Among all qualified bids, the lowest bid will be termed as L1. If L1 is 'Class-I local supplier', the contract will be awarded to L1,
iv. If L1 is not 'Class-I local supplier', the lowest bidder among the 'Class-I local supplier', will be invited to match the L1 price subject to Class-I local supplier's quoted price falling within the margin of purchase preference, and the contract shall be awarded to such 'Class-I local supplier' subject to matching the L1 price.
v. In case such lowest eligible 'Class-I local supplier' fails to match the L1 price, the 'Class-I local supplier' with the next higher bid within the margin of purchase preference shall be invited to match the L1 price and so on and contract shall be awarded accordingly. In case none of the 'Class-I local supplier' within the margin of purchase preference matches the L1 price, the contract may be awarded to the L1 bidder.

(d) "Class-II local supplier" will not get purchase preference in any procurement, undertaken by procuring entities.

4. **Applicability in tenders where contract is to be awarded to multiple bidders** *(Para 3B of DPIIT order)*-
In tenders where contract is to be awarded to multiple bidders subject to matching of L1 rates or otherwise, the 'Class-I local supplier' shall get purchase preference over 'Class-II local supplier' as well as 'Non-local supplier', as per following procedure:
a) In case there is sufficient local capacity and competition for the items to be procured, as notified by the Nodal Ministry, only 'Class-I local supplier' shall be eligible to bid. As such, the multiple supplier who would be awarded the contract, should be all and only 'Class-I local suppliers'.

   b) In other cases, 'Class-II local suppliers' and 'Non-Local suppliers' may also participate in the bidding process along with 'Class-I local supplier' as per provisions of this order.

   c) If 'Class-I local supplier' qualify for award of contract for at least 50% of the tendered quantity in any tender, the contract may be awarded to all the qualified bidders as per award criteria stipulated in the bid documents. However, in case 'Class-I local supplier' do not qualify for award of the contract for at least 50% of the tendered quantity, purchase preference should be given to the 'Class-I local supplier' over 'Class-II local supplier'/'Non-local suppliers' provided that their quoted rate falls within 20% margin of purchase preference of the highest quoted bidder considered for award of contract so as to ensure that the 'Class-I local suppliers' taken in totality or considered for award of contract for at least 50% of the tendered quantity.

   d) First purchase preference has to be given to the lowest quoting 'Class-I local supplier', whose quoted rates fall within 20% margin of purchase preference subject to its meeting the prescribed criteria for award of contract as also the constraints of maximum quantity that can be sourced from any single supplier. If the lowest quoting 'Class-I local supplier', does not qualify for purchase preference because of aforesaid constraints or does not accept the offered quantity, an opportunity may be given to next higher 'Class-I local supplier' falling within 20% margin of purchase preference, and so on.

   e) To avoid any ambiguity during bid evaluation process, the procuring entities may stipulate its own tender specific criteria for award of contract amongst different bidders including the procedure for purchase preference to 'Class-I local supplier' within the broad policy guidelines stipulate in sub-paras above.

5. **Exemption of small purchases** *(Para 4 in DPIIT order)*: Procurements where the estimated value to be procured is less than Rs. 5 lakhs shall be exempt from this Order. However, it shall be ensured by procuring entities that procurement is not split for the purpose of avoiding the provisions of this Order.

6. **Minimum Local Content** *(Para 5 in DPIIT order)*: The 'local content' requirement to categorize a supplier as 'Class-I local supplier' is minimum 50%. For 'Class-II local supplier', the local content requirement is minimum 20%. Nodal Ministry/Department may prescribe only a higher percentage of minimum local content requirement to categorize a supplier as 'Class-I local supplier'/'Class-II local supplier'. For the item for which Nodal Ministry/Department has not prescribed higher minimum local content notification under the order, it shall be 50% and 20% for 'Class-I local supplier'/'Class-II local supplier' respectively.

7. Vide DPIIT OM No. P-45021/102/2019-BE-IIPart(1) (E-50310) dated 4.03.2021 services such as transportation, insurance, installation, commissioning, training and after sales service support like AMC/CMC etc. shall not be considered as local value addition. Bidders offering imported products will fall under the category of Non- local suppliers. They can't claim themselves as Class-I local suppliers/Class-II local suppliers by claiming the services such as transportation, insurance, installation, commissioning, training and after sales service support like AMC/CMC etc. as local value addition.

8. **Margin of Purchase Preference** *(Para 6 of DPIIT order)*: The margin of purchase preference shall be 20%.

9. **Specifications in Tenders and other procurement solicitations** *(Para 10 of DPIIT order)*:
   a. Every procuring entity shall ensure that the eligibility conditions in respect of previous experience fixed in any tender or solicitation do not require proof of supply in other countries or proof of exports.
   b. Procuring entities shall endeavour to see that eligibility conditions, including on matters like turnover, production capability and financial strength do not result in unreasonable exclusion of 'Class-I local supplier'/ 'Class-II local supplier' who would otherwise be eligible, beyond what is essential for ensuring quality or creditworthiness of the supplier.
   c. Procuring entities shall, within 2 months of the issue of this Order review all existing eligibility norms and conditions with reference to sub-paragraphs 'a' and 'b' above.
   d. **Reciprocity Clause:**
      i. When a Nodal Ministry/Department identifies that Indian suppliers of an item are not allowed to participate and/ or compete in procurement by any foreign government, due to restrictive tender conditions which have direct or indirect effect of baring Indian companies such as registration in the procuring country, execution of projects of specific value in the procuring country etc. it shall provide such details to all its procuring entities including CMDs/CEOs of PSEs/PSUs, State Governments and other procurement agencies under their administrative control and GeM for appropriate reciprocal action.
      ii. Entities of countries which have been identified by the nodal Ministry/Department as not allowing Indian companies to participate in their Government procurement for any item related to that nodal Ministry shall not be allowed to participate in Government procurement in India for all the items related to that nodal Ministry/Department, except for the list of items published by the Ministry/Department permitting their participation.
      iii. The stipulation in (ii) above shall be part of all tenders invited by the Central Government procuring entities stated in (i) above. All purchase on GeM shall also necessarily have the above provisions for items identified by nodal Ministry/Department.
      iv. State Governments should be encouraged to incorporate similar provisions in their respective tenders.
      v. The term 'entity' of a country shall have the same meaning as under the FDI Policy of DPIIT as amended from time to time.
   e. Specifying foreign certification/ unreasonable technical specifications/ brands/ models in the bid document is restrictive and discriminatory practice against local

suppliers. If foreign certification is required to be stipulated because of non-availability of Indian Standards and/ or for any other reason, the same shall be done only after written approval of Secretary of Department concerned or any other authority having been designated such power by the Secretary of the Department concerned.

f. "All administrative Ministries/Departments whose procurement exceeds Rs. 1000 Crore per annum shall notify/ update their procurement projections every year, including those of PSEs/PSUs, for the next 5 years on their respective website."

Annexure-I

Sl. No.	Electrical Equipment for Generation, Transmission and Distribution sectors with sufficent local capacity and competition	Class-I Local Supplier (Minimum Local Content (%)
	(A) Common items for Transmission, Distribution and Generation Sector	
1	Power Transformers (up to 765 kV, including Generator transformers)	60
2	Instrument Transformer (up to 765 kV)	60
3	Transformer Oil Dry Out System (TODOS)	60
4	Reactors up to 765 kV	60
5	Oil Impregnated Bushing (up to 400 kV)	60
6	Resin Insultated Paper (RIP) bushings (up to 145 kV)	50
7	Circuit Breakers (up to 765 kV AC - Alternating Current)	60
8	Disconnectors/Isolators (up to 765 kV AC)	60
9	Wave trap (up to 765 kV AC)	60
10	Oil Filled Distribution Transformers up to & Including 33 kV [Cold Rolled Grain Oriented (CRGO)/Amorphous, Aluminium/Copper wound]	60
11	Dry Type Distribution Transformer upto and including 33 kV (CRGO/Amorphous, Aluminium/Copper wound)	60
12	Conventional Conductor	60
13	Accessories for Conventional conductors	60
14	High Temperature/High Temperature Low Sag (HTLS) conductors (such as Composite core, GAP, ACSS, INVAR, AL59) and Accessories	60
15	Optical ground wire (OPGW) – all designs	60
16	Fiber OpticTerminal Equipment (FOTE) for OPGW	50
17	OPGW related Hardware and Accessories	60
18	Remote Terminal Unit (RTU)	50
19	Power Cables and accessories up to 33 kV	60
20	Control cables including accessories	60
21	XLPE Cables up to 220 kV	60
22	Substation Structures	60
23	Transmission Line Towers	60
24	Porcelain (Disc/Long Rod) Insulators	60
25	Bus Post Insulators (Porcelain)	60
26	Porcelain Disc Insulators with Room Temperature Vulcanisation (RTV) coating	50
27	Porcelain Longrod Insulators withRoom Temperature Vulcanisation (RTV) coating	50
28	Hardware Fittings for Porcelain Insulators	60
29	Composite/Polymeric Long Rod Insulators	60
30	Hardware Fittings for Polymer Insulators	60
31	Bird Flight Diverter (BFD)	60
32	Power Line Carrier Communication (PLCC) System (up to 800 kV)	60
33	Gas Insulated Switchgear (up to 400 kV AC)	60
34	Gas Insulated Switchgear (above 400 kV AC)	50
35	Surge/Lightning Arrester (up to 765 kV AC)	60
36	Power Capacitors	60
37	Packaged Sub-station (6.6 kV to 33 kV)	60
38	Ring Main Unit (RMU) (up to 33 kV)	60
39	Medium Voltage (MV) GIS Panels (up to 33 kV)	60
40	Automation and Control System/Supervisory Control and data Acquisition (SCADA) System in Power System	50
41	Control and Relay Panel (including Digital/Numerical Relays)	50
42	Electrical Motors 0.37 kW to 1 MW	60
43	Energy Meters excluding smart meters	50
44	Control & power cables and Accessories (up to 1.1 kV)	60
45	Diesel Generating (DG) set	60

Sl. No.	Electrical Equipment for Generation, Transmission and Distribution sectors with sufficent local capacity and competition	Class-I Local Supplier (Minimum Local Content (%)
46	DC system (DC Battery & Battery Charger)	60
47	AC & DC Distribution Board	60
48	Indoor Air Insulated Switchgear (AIS) upto 33 kV	60
49	Poles (PCC, PSCC, Rolled Steel Joist, Rail Pole, Spun, Steel Tubular)	60
50	Material for Grounding/earthing system	60
51	Illumination system	60
52	Overhead Fault Sensing Indicator (FSI)	50
53	Power Quality Meters	50
54	Auxilliary Relays	50
55	Load Break Switch	50
	(B) Hydro Sector	
56	Hydro Turbine & Associated equipment	
	a) Francis Turbine	60
	b) Kaplan Turbine	60
	c) Pelton Turbine	50
57	Main Inlet Valve & Associated Equipment	60
58	Penstock Protection Valve and Associated Equipment	60
59	Governing system & Accessories	60
60	Generator for Hydro Project & Associated Equipment	60
61	Static Excitation System	60
62	Workshop Equipment	60
63	Cooling Water System	60
64	Compressed Air System	60
65	Drainage/Dewatering System	60
66	Fire Protection System	60
67	Heating, Ventilation & Air Conditioning System (HVAC)	60
68	Oil Handling System	60
69	Mechanical Balance of Plant (BOP) Items	60
	(C) Thermal Sector	
	Boiler Auxiliaries	
70	Air Pre-Heater	60
71	Steam Coil Air Pre Heater (SCAPH)	60
72	Steam soot blowers [wall blowers & Long Retractable Soot Blower (LRSB)]	60
73	Auxiliary Steam Pressure Reducing & Desuperheating (PRDS)	60
74	Fuel oil system	60
75	Seal air Fan	60
76	Ducts and dampers	60
77	Duct expansion joints	60
78	Blowdown tanks	60
79	Coal burners and oil burners	60
80	Coal mills	60
81	Gear Box of Coal Mill	50
82	Coal feeders	60
83	Primary Air Fans	60
84	Forced Draft Fans	60
85	Induced Draft Fans	60
86	Forced Draft (FD)/Induced Draft (ID)/ Primary Air (PA) Fan Servo Motor Assembly	50
87	Tubes (Carbon Steel)	50
88	Steam pipes (Carbon Steel)	50
89	Steam drum	50
90	Separator	50
91	Selective Catalytic Reduction (SCR)	50

Sl. No.	Electrical Equipment for Generation, Transmission and Distribution sectors with sufficent local capacity and competition	Class-I Local Supplier (Minimum Local Content (%)
	Electro-Static Precipitators (ESPs)	
92	Casing	60
93	Electrodes	60
94	Rapping System	60
95	Hopper Heaters	60
96	Transformer Rectifiers	60
97	Insulators	60
	Turbine & Auxiliaries	
98	Turbine (High Pressure/Intermediate Pressure/Low Pressure)	50
99	Condensate Extraction Pumps	60
100	Condenser On line Tube Cleaning System (COLTC)	60
101	Debris filters	60
102	Deaerator	60
103	Drain Cooler and Flash Tank	60
104	ECW Pump	50
105	Plate Heat Exchanger	50
106	Self- cleaning filters	50
107	Condensate Polishing Units (CPUs)	60
108	Chemical Dosing System	60
109	Oil Filter	60
110	Gland Steam Condenser	60
111	Oil Purifying Centrifuge	50
112	Water Cooled Condenser	50
113	Boiler Feed Pumps (BFPs)	50
	Generator and Auxillieries	
114	Generator (including Seal Oil System, Hydrogen Cooling System, Stator water cooling system)	60
	Electrical Works	
115	Control and metering equipment	60
	Control & Instrumentation System (C&I System)	
116	Thermocouples	50
117	Measuring instruments [Resistance Temperature Detectors (RTDs)], Local gauges	50
118	Actuators (Pneumatic and conventional electric)	50
119	Interplant Communication/ Public Address (PA) system except IP based	50
	Coal Handling Plant	
120	Conveyors	60
121	Wagon Tippler	60
122	Side Arm Charger	60
123	Paddle feeder	60
124	Crushers & Screens	60
125	Dust suppression (dry fog & plain water) system	60
126	Air Compressors	50
127	Magnetic separators & metal detectors	60
128	Coal Sampling System	60
129	Stacker cum reclaimer	60
130	Belt weighing & monitoring system.	60
131	Wheel & axle assembly (without bearings) for Bottom Opening Bottom Release (BOBR) Wagons	60
	Ash Handling System	
132	Clinker grinder	60
133	Water jet ejectors	60
134	Scrapper chain conveyor	60
135	Dry fly ash vacuum extraction system	60
136	Pressure pneumatic conveying system	60

Sl. No.	Electrical Equipment for Generation, Transmission and Distribution sectors with sufficent local capacity and competition	Class-I Local Supplier (Minimum Local Content (%)
137	Ash water & ash slurry pumps	60
138	Compressors, air dryers & air receivers	50
139	Ash water recovery system	60
	Raw Water Intake & Supply System	
140	Travelling water screens	60
141	Raw water supply pumps	60
142	Valves, RE joints etc.	60
	Water Treatment System and Effluent Treatment System	
143	Clarification plant	60
144	Filtration plant	60
145	Ultra filtration plant	50
146	Reverse Osmosis (RO) plant and its membrane	55
147	De-Mineralised water plant (DM Plant)	60
148	Chlorination plant	60
149	Chemical dosing system	60
150	Effluent Treatment Plant	60
	Circulationg Water (CW) & Auxiliary Circulating Water (ACW) System	
151	CW & ACW Pumps	60
152	Butter Fly (BF) valves, Non-return Valves (NRVs) etc.	60
153	Rubber Expansion (RE) joints	60
154	Air release valves	60
	Cooling Towers (NDCT/ IDCT)-Natural-Draft and Induced Draft Cooling Tower	
155	Water Distribution System	60
156	Spray nozzles	60
157	Packing	60
158	Drift eliminators	60
159	Cooling Tower (CT) Fans (for Induced Draft Cooling Towers IDCT)	60
160	Gear boxes, shafts & motors (for IDCT)	60
	Air Conditioning & Ventilation System	
161	Split & window air conditioners	60
162	Chilling/ condensing unit [upto 500 ton of refrigeration(TR)]	55
163	Air Handling Unit (AHU) and Fresh air unit	60
164	Cooling Towers	60
165	Air Washing Units (AWUs), axial fans, roof extractors	60
166	Ducts, louvers & dampers	60
	Flue Gas Desulphurization (FGD)	
167	Spray Nozzles,	50
168	Spray header	50
169	Oxidation Blowers	50
170	Limestone wet Ball Mill	50
171	Slurry Handling Pumps for FGD system	50
172	Booster Fans for FGD system	50
173	Carbon Steel Ducts and Dampers for FGD	60
174	Storage Tanks and Silos	60
175	Process Water Pump for FGD system	50
	(D) Other Common Items	
	Fire protection and detection system	
176	Motor driven fire water pumps	60
177	Diesel engine driven fire water pumps	60
178	Hydrant system for the power plant.	60
179	High velocity water spray system	60
180	Medium velocity water spray system	60
181	Foam protection system	60
182	Inert gas flooding system	60

Sl. No.	Electrical Equipment for Generation, Transmission and Distribution sectors with sufficent local capacity and competition	Class-I Local Supplier (Minimum Local Content (%)
183	Fire tenders	60
184	Portable fire-extinguishers	60
185	Cranes, EOT cranes, gantry crane & chain pulley blocks etc.	60
186	Elevator	60

(E) Minimum Local Content percentages in Engineering, Procurement & Construction (EPC) / Turnkey project

In case the contract is awarded through the EPC route, the contractor should comply with the requirement of MLC for individual items as listed in Annexure-I and should purchase these items only from Class-I Local supplier. In addition, MLC for complete EPC project may also be prescribed as below:

	(1) Package Based Works	Minimum Local Content (%)
1	Boiler	60
2	TG System (Water Cooled Condenser)	60
3	Ash Handling Plant	60
4	Coal Handling Plant	60
5	Electro-static Precipitator (ESP)	60
6	Circulating Water (CW) System	60
7	Cooling Tower	60
8	Water Treatment System	60
9	Air Conditioning System (below 500TR)	60
10	Flue Gas Desusphurisation (FGD) System	60
11	Station Control & Instrumentation (C&I)	50
12	Hydro Power Projects (Electro-Mechanical Works)	60
	Gas based generation	
	Overall Gas Turbine Package (on finished Product basis)	
13	< 44 MW	60
14	44 –145 MW	50
	Overall Combined Cycle Gas Turbine (CCGT) Package (on finished Product basis)	
15	< 44 MW	60
16	44 – 145 MW	60
17	> 150 MW	60
	(2) Project as a whole	
1	Works and service contracts in Power Sector	60
2	Transmission Line with Conventional conductors (ACSR, AAAC, AL-59 etc.)	60
3	Transmission Line with High temperature Low Sag (HTLS) conductors	60
4	HVAC Substation Air Insulated (AIS)	60
5	HVAC Substation Gas Insulated (GIS)	60
6	HVDC Substation	60
7	Distribution Sector	60

Annexure-II

General guidelines to be adopted selectively in an appropriate manner by the procuring entities in their tender documents.

1. The bidder shall have to be an entity registered in India in accordance with law.
2. The bids shall be in the language as prescribed by the tenderer/procurer.
3. The bids shall be in Indian Rupees (INR) (in respect of local content only).
4. Indian subsidiaries of foreign bidders shall have to meet the qualifying criteria in terms of capability, competency, financial position, past performance etc.
5. The bidder shall follow Indian laws, regulations and standards.
6. To be eligible for participation in the bid, foreign bidders shall compulsorily set up their manufacturing units on a long term basis in India as may be specified by the tenderer/ procurer.
7. Similar or better technology than the technology offered in respect of material, equipment and process involved shall be transferred to India. Along with the transfer of technology, adequate training in the respective field shall also be provided.
8. Country of origin of the equipment/material shall be provided in the bid.
9. For supply of equipment / material from the country of origin other than India, the bidder shall submit performance certificate in support of satisfactory operation in India or a country other than the country of origin having climatic and operational conditions including ambient temperature similar to that of India for more than _____ years (to be specified by the procurer).
10. The technologies/ products offered shall be environmental friendly, consuming less energy, safe, energy efficient, durable and long lasting under the prescribed operational conditions.
11. The supplier shall ensure supply of spares, materials and technological support for the entire life of the project.
12. The manufacturers/ supplier shall list out the products and components producing Toxic E-waste and other waste as may be specified. It shall have an Extended Producers Responsibility (EPR) so that after the completion of the lifecycle, the materials are safely recycled / disposed of by the Manufacturer/ supplier and for this, the Manufacturer/supplier along with procurer has to establish recycling / disposal unit or as may be specified.
13. Minimum Local Content requirement for goods, services or works shall be in accordance with the conditions laid down in respective Order(s) of the sectors on Public Procurement (Preference to Make in India) to provide for purchase preference (linked with local content).

14. The equipment/ material sourced from foreign companies may be tested in accredited labs in India before acceptance wherever such facilities are available.
15. The Tender fee and the Bank Guarantee (BG) shall be in Indian Rupees only.
16. The bidder shall have to furnish a certificate regarding cyber security/safety of the equipment/process to be supplied/services to be rendered as safe to connect.
17. Applicable safety requirements shall be met. Regular safety audit shall be carried out by the manufacturer/ supplier.
18. Statutory laws/regulations including the labour and environmental laws shall be strictly complied with during supply, storage, erection, commissioning and operation process. A regular compliance report shall be submitted to the procurer/appropriate Authorities.
19. Formation of new joint venture in India shall be permitted only with the Indian companies.
20. Tendering by the agent shall not be accepted.
21. In case local testing is not considered necessary by the procurer, theoriginal test report in the language prescribed by the procurer may be accepted. The translated test report shall not be accepted unless it is notarised.
22. Certification/compliance as per the Indian Standards/ International Standards/ Indian Regulations/ specified Standards shall be mandatory, where ever applicable.
23. Quality assurance of the product shall be carried out by the procurer or an independent third party agency appointed by the procurer. Manufacturing Quality Plan as approved by the procurer shall be followed by the manufacturer/supplier.
24. Wherever required by the procurer, foreign supplier shall establish fully functional service centers in India and shall keep spares/material locally for future needs of utilities.
25. Arbitration proceedings shall be instituted in India only and all disputes shall be settled as per applicable Indian Laws.

No. P-45021/2/2017-PP (BE-II)
Government of India
Ministry of Commerce and Industry
Department for Promotion of Industry and Internal Trade
(Public Procurement Section)

Udyog Bhawan, New Delhi
Dated: 16th September, 2020

To

All Central Ministries/Departments/CPSUs/All concerned

ORDER

Subject: Public Procurement (Preference to Make in India), Order 2017– Revision; regarding.

Department for Promotion of Industry and Internal Trade, in partial modification [Paras 2, 3, 5, 10 & 13] of Order No.P-45021/2/2017-B.E.-II dated 15.6.2017 as amended by Order No.P-45021/2/2017-B.E.-II dated 28.05.2018, Order No.P-45021/2/2017-B.E.-II dated 29.05.2019 and Order No.P-45021/2/2017-B.E.-II dated 04.06.2020, hereby issues the revised 'Public Procurement (Preference to Make in India), Order 2017" dated 16.09.2020 effective with immediate effect.

Whereas it is the policy of the Government of India to encourage 'Make in India' and promote manufacturing and production of goods and services in India with a view to enhancing income and employment, and

Whereas procurement by the Government is substantial in amount and can contribute towards this policy objective, and

Whereas local content can be increased through partnerships, cooperation with local companies, establishing production units in India or Joint Ventures (JV) with Indian suppliers, increasing the participation of local employees in services and training them,

Now therefore the following Order is issued:

1. This Order is issued pursuant to Rule 153 (iii) of the General Financial Rules 2017.

2. **Definitions**: For the purposes of this Order:

   'Local content' means the amount of value added in India which shall, unless otherwise prescribed by the Nodal Ministry, be the total value of the item procured (excluding net domestic indirect taxes) minus the value of imported content in the item (including all customs duties) as a proportion of the total value, in percent.

   'Class-I local supplier' means a supplier or service provider, whose goods, services or works offered for procurement, meets the minimum local content as prescribed for 'Class-I local supplier' under this Order.

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'Class-II local supplier' means a supplier or service provider, whose goods, services or works offered for procurement, meets the minimum local content as prescribed for 'Class-II local supplier' but less than that prescribed for 'Class-I local supplier' under this Order.

'Non - Local supplier' means a supplier or service provider, whose goods, services or works offered for procurement, has local content less than that prescribed for 'Class-II local supplier' under this Order.

'L1' means the lowest tender or lowest bid or the lowest quotation received in a tender, bidding process or other procurement solicitation as adjudged in the evaluation process as per the tender or other procurement solicitation.

'Margin of purchase preference' means the maximum extent to which the price quoted by a "Class-I local supplier" may be above the L1 for the purpose of purchase preference.

'Nodal Ministry' means the Ministry or Department identified pursuant to this order in respect of a particular item of goods or services or works.

'Procuring entity' means a Ministry or department or attached or subordinate office of, or autonomous body controlled by, the Government of India and includes Government companies as defined in the Companies Act.

'Works' means all works as per Rule 130 of GFR- 2017, and will also include *'turnkey works'*.

3. Eligibility of 'Class-I local supplier'/ 'Class-II local supplier'/ 'Non-local suppliers' for different types of procurement

(a) In procurement of all goods, services or works in respect of which the Nodal Ministry / Department has communicated that there is sufficient local capacity and local competition, only 'Class-I local supplier', as defined under the Order, shall be eligible to bid irrespective of purchase value.

(b) Only 'Class-I local supplier' and 'Class-II local supplier', as defined under the Order, shall be eligible to bid in procurements undertaken by procuring entities, except when Global tender enquiry has been issued. In global tender enquiries, 'Non-local suppliers' shall also be eligible to bid along with 'Class-I local suppliers' and 'Class-II local suppliers'. In procurement of all goods, services or works, not covered by sub-para 3(a) above, and with estimated value of purchases less than Rs. 200 Crore, in accordance with Rule 161(iv) of GFR, 2017, Global tender enquiry shall not be issued except with the approval of competent authority as designated by Department of Expenditure.

(c) For the purpose of this Order, works includes Engineering, Procurement and Construction (EPC) contracts and services include System Integrator (SI) contracts.

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3A. Purchase Preference

(a) Subject to the provisions of this Order and to any specific instructions issued by the Nodal Ministry or in pursuance of this Order, purchase preference shall be given to 'Class-I local supplier' in procurements undertaken by procuring entities in the manner specified here under.

(b) In the procurements of goods or works, which are covered by para 3(b) above and which are divisible in nature, the 'Class-I local supplier' shall get purchase preference over 'Class-II local supplier' as well as 'Non-local supplier', as per following procedure:

i. Among all qualified bids, the lowest bid will be termed as L1. If L1 is 'Class-I local supplier', the contract for full quantity will be awarded to L1.

ii. If L1 bid is not a 'Class-I local supplier', 50% of the order quantity shall be awarded to L1. Thereafter, the lowest bidder among the 'Class-I local supplier' will be invited to match the L1 price for the remaining 50% quantity subject to the Class-I local supplier's quoted price falling within the margin of purchase preference, and contract for that quantity shall be awarded to such 'Class-I local supplier' subject to matching the L1 price. In case such lowest eligible 'Class-I local supplier' fails to match the L1 price or accepts less than the offered quantity, the next higher 'Class-I local supplier' within the margin of purchase preference shall be invited to match the L1 price for remaining quantity and so on, and contract shall be awarded accordingly. In case some quantity is still left uncovered on Class-I local suppliers, then such balance quantity may also be ordered on the L1 bidder.

(c) In the procurements of goods or works, which are covered by para 3(b) above and which are not divisible in nature, and in procurement of services where the bid is evaluated on price alone, the 'Class-I local supplier' shall get purchase preference over 'Class-II local supplier' as well as 'Non-local supplier', as per following procedure:

i. Among all qualified bids, the lowest bid will be termed as L1. If L1 is 'Class-I local supplier', the contract will be awarded to L1.

ii. If L1 is not 'Class-I local supplier', the lowest bidder among the 'Class-I local supplier', will be invited to match the L1 price subject to Class-I local supplier's quoted price falling within the margin of purchase preference, and the contract shall be awarded to such 'Class-I local supplier' subject to matching the L1 price.

iii. In case such lowest eligible 'Class-I local supplier' fails to match the L1 price, the 'Class-I local supplier' with the next higher bid within the margin of purchase preference shall be invited to match the L1 price and so on and contract shall be awarded accordingly. In case none of the 'Class-I local supplier' within the margin of purchase preference matches the L1 price, the contract may be awarded to the L1 bidder.

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(d) "Class-II local supplier" will not get purchase preference in any procurement, undertaken by procuring entities

3B. Applicability in tenders where contract is to be awarded to multiple bidders - In tenders where contract is awarded to multiple bidders subject to matching of L1 rates or otherwise, the 'Class-I local supplier' shall get purchase preference over 'Class-II local supplier' as well as 'Non-local supplier', as per following procedure:

a) In case there is sufficient local capacity and competition for the item to be procured, as notified by the nodal Ministry, only Class I local suppliers shall be eligible to bid. As such, the multiple suppliers, who would be awarded the contract, should be all and only 'Class I Local suppliers'.

b) In other cases, 'Class II local suppliers' and 'Non local suppliers' may also participate in the bidding process along with 'Class I Local suppliers' as per provisions of this Order.

c) If 'Class I Local suppliers' qualify for award of contract for at least 50% of the tendered quantity in any tender, the contract may be awarded to all the qualified bidders as per award criteria stipulated in the bid documents. However, in case 'Class I Local suppliers' do not qualify for award of contract for at least 50% of the tendered quantity, purchase preference should be given to the 'Class I local supplier' over 'Class II local suppliers'/ 'Non local suppliers' provided that their quoted rate falls within 20% margin of purchase preference of the highest quoted bidder considered for award of contract so as to ensure that the 'Class I Local suppliers' taken in totality are considered for award of contract for at least 50% of the tendered quantity.

d) First purchase preference has to be given to the lowest quoting 'Class-I local supplier', whose quoted rates fall within 20% margin of purchase preference, subject to its meeting the prescribed criteria for award of contract as also the constraint of maximum quantity that can be sourced from any single supplier. If the lowest quoting 'Class-I local supplier', does not qualify for purchase preference because of aforesaid constraints or does not accept the offered quantity, an opportunity may be given to next higher 'Class-I local supplier', falling within 20% margin of purchase preference, and so on.

e) To avoid any ambiguity during bid evaluation process, the procuring entities may stipulate its own tender specific criteria for award of contract amongst different bidders including the procedure for purchase preference to 'Class-I local supplier' within the broad policy guidelines stipulated in sub-paras above.

4. **Exemption of small purchases**: Notwithstanding anything contained in paragraph 3, procurements where the estimated value to be procured is less than Rs. 5 lakhs shall be exempt from this Order. However, it shall be ensured by procuring entities that procurement is not split for the purpose of avoiding the provisions of this Order.

5. **Minimum local content**: The 'local content' requirement to categorize a supplier as 'Class-I local supplier' is minimum 50%. For 'Class-II local supplier', the 'local content' requirement is minimum 20%. Nodal Ministry/ Department may prescribe only a higher

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percentage of minimum local content requirement to categorize a supplier as 'Class-I local supplier'/ 'Class-II local supplier'. For the items, for which Nodal Ministry/ Department has not prescribed higher minimum local content notification under the Order, it shall be 50% and 20% for 'Class-I local supplier'/ 'Class-II local supplier' respectively.

6. **Margin of Purchase Preference**: The margin of purchase preference shall be 20%.

7. **Requirement for specification in advance**: The minimum local content, the margin of purchase preference and the procedure for preference to Make in India shall be specified in the notice inviting tenders or other form of procurement solicitation and shall not be varied during a particular procurement transaction.

8. **Government E-marketplace**: In respect of procurement through the Government E-marketplace (GeM) shall, as far as possible, specifically mark the items which meet the minimum local content while registering the item for display, and shall, wherever feasible, make provision for automated comparison with purchase preference and without purchase preference and for obtaining consent of the local supplier in those cases where purchase preference is to be exercised.

9. **Verification of local content**:

   a. The 'Class-I local supplier'/ 'Class-II local supplier' at the time of tender, bidding or solicitation shall be required to indicate percentage of local content and provide self-certification that the item offered meets the local content requirement for 'Class-I local supplier'/ 'Class-II local supplier', as the case may be. They shall also give details of the location(s) at which the local value addition is made.

   b. In cases of procurement for a value in excess of Rs. 10 crores, the 'Class-I local supplier'/ 'Class-II local supplier' shall be required to provide a certificate from the statutory auditor or cost auditor of the company (in the case of companies) or from a practicing cost accountant or practicing chartered accountant (in respect of suppliers other than companies) giving the percentage of local content.

   c. Decisions on complaints relating to implementation of this Order shall be taken by the competent authority which is empowered to look into procurement-related complaints relating to the procuring entity.

   d. Nodal Ministries may constitute committees with internal and external experts for independent verification of self-declarations and auditor's/ accountant's certificates on random basis and in the case of complaints.

   e. Nodal Ministries and procuring entities may prescribe fees for such complaints.

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

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g. A supplier who has been debarred by any procuring entity for violation of this Order shall not be eligible for preference under this Order for procurement by any other procuring entity for the duration of the debarment. The debarment for such other procuring entities shall take effect prospectively from the date on which it comes to the notice of other procurement entities, in the manner prescribed under paragraph 9h below.

h. The Department of Expenditure shall issue suitable instructions for the effective and smooth operation of this process, so that:

   i. The fact and duration of debarment for violation of this Order by any procuring entity are promptly brought to the notice of the Member-Convenor of the Standing Committee and the Department of Expenditure through the concerned Ministry /Department or in some other manner;

   ii. on a periodical basis such cases are consolidated and a centralized list or decentralized lists of such suppliers with the period of debarment is maintained and displayed on website(s);

   iii. in respect of procuring entities other than the one which has carried out the debarment, the debarment takes effect prospectively from the date of uploading on the website(s) in the such a manner that ongoing procurements are not disrupted.

10. **Specifications in Tenders and other procurement solicitations**:

a. Every procuring entity shall ensure that the eligibility conditions in respect of previous experience fixed in any tender or solicitation do not require proof of supply in other countries or proof of exports.

b. Procuring entities shall endeavour to see that eligibility conditions, including on matters like turnover, production capability and financial strength do not result in unreasonable exclusion of 'Class-I local supplier' / 'Class-II local supplier' who would otherwise be eligible, beyond what is essential for ensuring quality or creditworthiness of the supplier.

c. Procuring entities shall, within 2 months of the issue of this Order review all existing eligibility norms and conditions with reference to sub-paragraphs 'a' and 'b' above.

d. Reciprocity Clause

   i. When a Nodal Ministry/Department identifies that Indian suppliers of an item are not allowed to participate and/ or compete in procurement by any foreign government, due to restrictive tender conditions which have direct or indirect effect of barring Indian companies such as registration in the procuring country, execution of projects of specific value in the procuring country etc., it shall provide such details to all its procuring entities including CMDs/CEOs of PSEs/PSUs, State Governments and other procurement agencies under their administrative control and GeM for appropriate reciprocal action.

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ii. Entities of countries which have been identified by the nodal Ministry/Department as not allowing Indian companies to participate in their Government procurement for any item related to that nodal Ministry shall not be allowed to participate in Government procurement in India for all items related to that nodal Ministry/ Department, except for the list of items published by the Ministry/ Department permitting their participation.

iii. The stipulation in (ii) above shall be part of all tenders invited by the Central Government procuring entities stated in (i) above. All purchases on GeM shall also necessarily have the above provisions for items identified by nodal Ministry/ Department.

iv. State Governments should be encouraged to incorporate similar provisions in their respective tenders.

v. The term 'entity' of a country shall have the same meaning as under the FDI Policy of DPIIT as amended from time to time.

e. Specifying foreign certifications/ unreasonable technical specifications/ brands/ models in the bid document is restrictive and discriminatory practice against local suppliers. If foreign certification is required to be stipulated because of non-availability of Indian Standards and/or for any other reason, the same shall be done only after written approval of Secretary of the Department concerned or any other Authority having been designated such power by the Secretary of the Department concerned.

f. "All administrative Ministries/Departments whose procurement exceeds *Rs.* 1000 Crore per annum shall notify/ update their procurement projections every year, including those of the PSEs/PSUs, for the next 5 years on their respective website."

10A. **Action for non-compliance of the Provisions of the Order:** In case restrictive or discriminatory conditions against domestic suppliers are included in bid documents, an inquiry shall be conducted by the Administrative Department undertaking the procurement (including procurement by any entity under its administrative control) to fix responsibility for the same. Thereafter, appropriate action, administrative or otherwise, shall be taken against erring officials of procurement entities under relevant provisions. Intimation on all such actions shall be sent to the Standing Committee.

11. **Assessment of supply base by Nodal Ministries**: The Nodal Ministry shall keep in view the domestic manufacturing / supply base and assess the available capacity and the extent of local competition while identifying items and prescribing the higher minimum local content or the manner of its calculation, with a view to avoiding cost increase from the operation of this Order.

12. **Increase in minimum local content**: The Nodal Ministry may annually review the local content requirements with a view to increasing them, subject to availability of sufficient local competition with adequate quality.

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13 **Manufacture under license/ technology collaboration agreements with phased indigenization**: While notifying the minimum local content, Nodal Ministries may make special provisions for exempting suppliers from meeting the stipulated local content if the product is being manufactured in India under a license from a foreign manufacturer who holds intellectual property rights and where there is a technology collaboration agreement / transfer of technology agreement for indigenous manufacture of a product developed abroad with clear phasing of increase in local content.

13A. In procurement of all goods, services or works in respect of which there is substantial quantity of public procurement and for which the nodal ministry has not notified that there is sufficient local capacity and local competition, the concerned nodal ministry shall notify an upper threshold value of procurement beyond which foreign companies shall enter into a joint venture with an Indian company to participate in the tender. Procuring entities, while procuring such items beyond the notified threshold value, shall prescribe in their respective tenders that foreign companies may enter into a joint venture with an Indian company to participate in the tender. The procuring Ministries/Departments shall also make special provisions for exempting such joint ventures from meeting the stipulated minimum local content requirement, which shall be increased in a phased manner.

14. **Powers to grant exemption and to reduce minimum local content**: The administrative Department undertaking the procurement (including procurement by any entity under its administrative control), with the approval of their Minister-in-charge, may by written order, for reasons to be recorded in writing,

a. reduce the minimum local content below the prescribed level; or
b. reduce the margin of purchase preference below 20%; or
c. exempt any particular item or supplying entities from the operation of this Order or any part of the Order.

A copy of every such order shall be provided to the Standing Committee and concerned Nodal Ministry / Department. The Nodal Ministry / Department concerned will continue to have the power to vary its notification on Minimum Local Content.

15. **Directions to Government companies**: In respect of Government companies and other procuring entities not governed by the General Financial Rules, the administrative Ministry or Department shall issue policy directions requiring compliance with this Order.

16. **Standing Committee**: A standing committee is hereby constituted with the following membership.

Secretary, Department for Promotion of Industry and Internal Trade—Chairman
Secretary, Commerce—Member
Secretary, Ministry of Electronics and Information Technology—Member
Joint Secretary (Public Procurement), Department of Expenditure—Member
Joint Secretary (DPIIT)—Member-Convenor

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The Secretary of the Department concerned with a particular item shall be a member in respect of issues relating to such item. The Chairman of the Committee may co-opt technical experts as relevant to any issue or class of issues under its consideration.

17. **Functions of the Standing Committee**: The Standing Committee shall meet as often as necessary, but not less than once in six months. The Committee

    a. shall oversee the implementation of this order and issues arising therefrom, and make recommendations to Nodal Ministries and procuring entities.
    b. shall annually assess and periodically monitor compliance with this Order
    c. shall identify Nodal Ministries and the allocation of items among them for issue of notifications on minimum local content
    d. may require furnishing of details or returns regarding compliance with this Order and related matters
    e. may, during the annual review or otherwise, assess issues, if any, where it is felt that the manner of implementation of the order results in any restrictive practices, cartelization or increase in public expenditure and suggest remedial measures
    f. may examine cases covered by paragraph 13 above relating to manufacture under license/ technology transfer agreements with a view to satisfying itself that adequate mechanisms exist for enforcement of such agreements and for attaining the underlying objective of progressive indigenization
    g. may consider any other issue relating to this Order which may arise.

18. **Removal of difficulties**: Ministries /Departments and the Boards of Directors of Government companies may issue such clarifications and instructions as may be necessary for the removal of any difficulties arising in the implementation of this Order.

19. **Ministries having existing policies**: Where any Ministry or Department has its own policy for preference to local content approved by the Cabinet after 1st January 2015, such policies will prevail over the provisions of this Order. All other existing orders on preference to local content shall be reviewed by the Nodal Ministries and revised as needed to conform to this Order, within two months of the issue of this Order.

20. **Transitional provision**: This Order shall not apply to any tender or procurement for which notice inviting tender or other form of procurement solicitation has been issued before the issue of this Order.

(Rajesh Gupta)
Director
Tel: 23063211
rajesh.gupta66@gov.in

A BHARAT HEAVY ELECTRICALS LIMITED
TRANSMISSION BUSINESSS GROUP
MATERIAL RECEIPT CERTIFICATE

a) Site:
b) Invoice no.:
c) LR No. with date:
d) Vehicle no.:
e) Date of receipt of material at site:
f) Supplier:
g) Material details (as mentioned below):

S.no.	Item Description	Type of Packages	Unit (MT/KM/ NO.)	Qty as per packing list	Qty Received	Remarks

Other Remarks: Materials subject to physical verification.

Signature with date: _____

Name & Designation: _____
(With Seal)

INSPECTION REQUEST

1. Name & Address of Supplier :
2. Project :
3. Purchase Order No., Revision No. & Date :
4. Details of equipment / Material to be Inspected

Sl. No.	Material offered for Inspection	P.O. Item No.	Total Quantity Ordered	Quantity offered for Inspection	Quantity Already Cleared	P.O. value of offered qty.

5. For structure, whether BOM & Proto Corrected Drawings approved and available at place of inspection : Yes / No
6. Whether GTP/Drgs approved in Category – 1 available at place of inspection : Yes / No
7. Whether Quality Plan approved in Category – 1 available at place of inspection : Yes / No.
8. Whether all type tests approved by Engineering :Yes / No
9. (a) Place of Inspection & Address :
9. (b) Name & contact No. of Supplier rep. for inspection :
10. Sub – supplier contact person's name & contact No. :
11. Weekly off day :
12. Working Hours :
13. Date on which inspection requested (Inspection call to be raised at least 7 days prior to inspection) :
14. No of road permits required :

It is certified that the above materials shall be completed in all respects and shall have been inspected by us before the date indicated above for inspection. You are requested to please depute your representative for inspection

Signature
Name :
Contact No. :
Date :

Distribution :

1. Material Management , BHEL, New Delhi

Note :

1. Unsigned inspection request & Inspection requests not given in this format are not accepted.
2. Drawings, Quality Plan should be approved in category – I by BHEL Transmission Business Engineering Management before the inspection date. In case inspection request is given without Category – I approved documents, supplier should be obtain from BHEL Transmission Business Engineering Management in writing to this effect and attach to inspection request.